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Detroit Office
August 30, 1988

Mr. Steve Lingle
Director, Hazardous Site Evaluation Division
U. S. Environmental Protection Agency
401 M Street, S.W.
Washington, DC 20460

Re: **National Priorities List**
Update Number 7
Proposed Listing
Hi-Mill Manufacturing Company Property
Highland Township, Oakland County, Michigan

Dear Mr. Lingle:

This firm represents Hi-Mill Manufacturing Company and is transmitting herewith, on behalf of our clients, comments concerning and objection to the proposal to include the Hi-Mill Manufacturing Company property on the National Priorities List.

We have requested the Michigan Department of Natural Resources to review the scoring for this site also. I am advised by Mr. Gary Klepper, Chief of the Site Assessment Unit, Remedial Action Section, Environmental Response Division of the Michigan Department of Natural Resources that his staff is in the process of reviewing the scoring for this site. We are advised that the State of Michigan has not previously scored this site because initial scoring was done by EPA's consultant, Ecology and Environment.

The Michigan Department of Natural Resources further advises me that it has not completed its review of the scoring. The Department is certainly not prepared at this time to endorse the conclusions on site scoring contained in the attached comments, but Department staff have indicated to us that they feel that there were significant errors in the initial HRS scoring. Consequently, the Michigan Department of Natural Resources may file comments, also, in the near future concerning the HRS score for this site.

Thank you for your consideration of the enclosed comments. If your staff should have any questions or if there is further information which may be of assistance in evaluating this submission, please feel free to call upon me or my associate, Mr. Robert Davis. My direct telephone number is (313) 225-7075 and Mr. Davis' is (313) 225-7042.

Very truly yours,

BUTZEL LONG GUST KLEIN & VAN ZILE

Jack D. Shumate

JDS:br

cc: Valdas Adamkus (with enclosures)
Gary Klepper (with enclosures)

COMMENTS and OBJECTIONS of HI-MILL MANUFACTURING COMPANY
to
PROPOSED LISTING OF HI-MILL MANUFACTURING PROPERTY
on the
NATIONAL PRIORITIES LIST

Hi-Mill Manufacturing Company ("Hi-Mill"), through its attorneys, Butzel Long Gust Klein & Van Zile, offers these comments on, and objections to, the proposed inclusion of the Hi-Mill property on the National Priorities List ("NPL") for action under the Comprehensive Environmental Response, Compensation, and Liability Act of 1980, as amended, ("CERCLA").

The Hi-Mill site (the "Site"), located in Highland Township, Oakland County, Michigan, was proposed for inclusion on the NPL in Update 7, 53 FR 122, page 23995, June 24, 1988.

Historical and Regulatory Background

Hi-Mill has been engaged in fabrication of tubular copper, aluminum, and brass parts at the Site since 1946. These operations principally involve cutting and shaping of metal tubing purchased from other manufacturers. Some process waste waters are produced by metal finishing operations.

Process waste waters were formerly discharged to two small, unlined lagoons adjacent to the production building.

In August, 1975, the Michigan Department of Natural Resources (MDNR) informed Hi-Mill that continued discharge of process waste water to the lagoons required a Groundwater Discharge Permit issued by MDNR pursuant to the Michigan Water Resources Commission Act, P.A. 1929 No. 245. Hi-Mill promptly applied for, and on October 31, 1975, obtained, the permit.

One of the conditions of the 1975 permit was that Hi-Mill minimize the amount of effluent discharged under the permit. Accordingly, Hi-Mill promptly engaged a consulting engineer to design and install a system to capture process waste water for disposal. By March 1, 1979, the new system was fully operational and has remained in operation since that date. Thus, since March 1, 1979, process waste water has been properly disposed off-Site and there has been no discharge to the lagoons.

In 1983, MDNR recommended that wastes remaining in the lagoons be removed and properly disposed off-Site. Hi-Mill promptly proceeded to drain the lagoons, dredged all sludge and silt down to the underlying clay, and back-filled the excavations with clean sand. All wastes removed in this operation were properly disposed off-Site.

Thus, by early 1984, Hi-Mill had completed source control measures recommended and supervised by MDNR.

MDNR undertook monitoring of the surficial aquifer at the Site, installing observation wells to a maximum depth of 6.9 feet. These wells were completed into perched water above a layer of low-permeability clay. In January, 1984, MDNR advised Hi-Mill by letter, which is attached as Exhibit 1, that further sampling would be conducted by MDNR in the spring of 1984. The letter expressed the hope that no further remedial action would be required, "Since the levels are not excessive and are believed to be contained within clay * * *." The letter also advised that, after the MDNR sampling

in the spring of 1984, "Any additional analysis of the groundwater, deemed necessary, will then be required of you." (Emphasis added.)

MDNR requested no further investigative or remedial action of Hi-Mill; rather, MDNR nominated the Site for inclusion on the NPL. There has been disagreement within MDNR concerning the propriety of this nomination. MDNR's Southeast Michigan District Office, which has jurisdiction over the Site, advised against nomination of the Site for the NPL. The District Office noted the history of cooperation by Hi-Mill and recommended that MDNR should request the company to take any necessary action (see memorandum of Oladipo Oyinsan, dated October 13, 1986, attached as Exhibit 2).

Application of Hazard Ranking System

Hi-Mill submits that the Hazard Ranking System ("HRS") established in 40 CFR Part 300, Appendix A, has been inaccurately applied to this Site. The inaccuracies result from two principal errors in applying the HRS to the facts in the record:

1. Treating two discrete aquifers as one.

   The record indicates that MDNR has documented a release of contaminants only to the perched water existing to a maximum depth of 6.9 feet. Further, MDNR has documented the existence of a confining layer of low-permeability clay beneath the perched aquifer.

   Area water well logs show that the shallowest aquifer usable for water wells begins at a depth of 45 feet. Due to (1) the spatial separation of the perched

water and the first usable aquifer and (2) the presence of the low-permeability clay layer, these two aquifers must be evaluated as discrete aquifers.

The initial HRS scoring improperly provided combined treatment to the two aquifers, applying established facts about the perched water to the usable aquifer. This was done despite the fact that data in the record, resulting from tests of wells completed into the first usable aquifer, show that those wells meet Federal Drinking Water Standards.

2. Improper Evaluation of Resource Affected.

The resource affected is a shallow marshy area having a seasonally variable depth to a maximum of 2.5 feet. The marsh has value as a wetland, but has no value for recreational, commercial, or domestic purposes.

The initial HRS scoring package confused the marsh with Waterbury Lake, which does have recreational and, possibly, commercial and domestic value. Evidence in the record establishes, however, that there is no connection between the marsh and Waterbury Lake; indeed, MDNR used water samples from Waterbury Lake to establish background quality.

The effect of these two errors is more fully discussed in the report of Hi-Mill's environmental consultant, Techna Corporation ("Techna"), which is attached as Exhibit 3 and is incorporated by

reference in these Comments and Objections. The Techna report further identifies specific portions of the rule-making record which were either ignored or improperly used in the initial HRS scoring.

As noted in the Techna report, an accurate application of the HRS results in a score for this Site of 3.91 for the perched water and 23.16 for the first usable aquifer. Both scores are well below the score of 28.50 established by 40 CFR Part 300 as the minimum score for inclusion of a site on the NPL.

Significance of Errors in HRS Scoring of the Site

Proper HRS scoring of the Site is critical in this case because the Hi-Mill Site should not qualify as a CERCLA site.

We realize that achieving an HRS score of 28.50 is not the only way in which a site can become a CERCLA site, but it is the only mechanism relevant to this Site. The State of Michigan has not designated the Site as its top priority and the extraordinary circumstances are not present to apply CERCLA pursuant to 40 CFR 300.66(b)(4). Thus, the proper HRS scoring is vital.

The significance of this score was emphasized in SCA Services of Indiana, Inc. v. Thomas, 634 F.Supp. 1355 (N.D. Ind., 1986), when the Court held, at pages 1364-5:

> "The regulatory structure established by EPA has created a dividing line between those properties that require remedial action and those which do not: only those properties scoring more than 28.50 on the HRS will be included on the NPL and slated for further attention. In effect, the EPA has created a definition for properties which are dangerous enough to warrant attention--properties with scores over 28.50. The

> corollary is that property below this threshold is considered safe enough by the EPA so as not to warrant further action under a statute designed to protect the public from hazardous wastes."

Updating the NPL and screening a proposed site for inclusion on the NPL (including the HRS scoring procedure) is a rule-making procedure subject to the requirements of the Administrative Procedure Act ("APA"), SCA Services of Indiana, supra; U.S. Ecology v. Carlson, 638 F.Supp. 513 (C.D. Ill., 1986). It is therefore necessary that EPA follow its own rules and regulations in the scoring procedure.

EPA has recognized the importance of properly applying the HRS criteria. For example, in 49 FR 200, October 15, 1984, page 40321, the Agency observed that:

> "In reviewing these submissions, EPA Headquarters conducts further quality assurance audits to ensure accuracy and consistency among the various EPA and State offices participating in the scoring."
>
> (emphasis added)

This is necessary to assure that the Agency's determination to place a site on the NPL meets the APA standard that its action is not arbitrary and capricious. In this instance, it is essential that EPA Headquarters correct the HRS scoring for the Site to reflect all relevant evidence in the record.

The proper test in a case such as this was enunciated in Eagle-Picher Industries v. United States EPA, 759 F.2d 905 (D.C. Circ., 1985). The Court said, at page 921:

> "Under the arbitrary and capricious standard we look to see if the Agency has examined

relevant data and has articulated a rational explanation for its action."

(emphasis added)

As demonstrated in the Techna Report (Exhibit 3), the initial HRS score resulted from a failure to consider some relevant data and misapplication or misconstruction of other data. This clearly violates the standard quoted above and requires correction by EPA Headquarters.

Conclusion

The Hi-Mill Site was improperly scored due to inaccuracies in application of the HRS and failure to consider certain relevant facts in the record. EPA should correct the scoring to a maximum of 23.16 and decline to place the Site on the NPL.

Under a proper application of the HRS, the Site does not justify an expenditure of the limited resources of EPA. If further action is appropriate at the Site, it will be undertaken by Hi-Mill under the supervision of MDNR. Hi-Mill has already assured MDNR of its continued cooperation.

Respectfully submitted,

By: BUTZEL LONG GUST KLEIN & VAN ZILE

By: Jack D. Shumate
Jack D. Shumate

By: Robert Charles Davis
Robert Charles Davis

Attorneys for Hi-Mill Manufacturing Company

STATE OF MICHIGAN

JAMES J. BLANCHARD, Governor

DEPARTMENT OF NATURAL RESOURCES

STEVENS T. MASON BUILDING
BOX 30028
LANSING, MI 48909

RONALD O. SKOOG, Director

Groundwater Quality Div.
1120 W. State Fair Ave.
Detroit, MI 48203

January 9, 1984

Robert Beard
Hi Mill Manufacturing Co.
1704 Highland Road
Highland, MI 48031

SUBJECT: Lagoon Cleanup, Hi Mill Manufacturing, Oakland County (630375)

Dear Mr. Beard:

We have received and reviewed the analysis from the last sampling conducted December 5, 1983. They indicate the removal of the liquid and sludge has significantly reduced the levels of metals contained there.

The analysis conducted on the smaller lagoon show slightly elevated levels of Barium, Selenium and possibly Cyanide at the 6 foot level. Since the levels are not excessive and are believed to be contained within clay, no removal of the sludge will be requested, at this time.

In September 1983 the department observation wells along the south and west of your property were sampled. Unacceptable levels of metals especially aluminum and iron were indicated. This data will be compared to future samplings. The first of such samplings will be taken this spring. Any additional analysis of the groundwater, deemed necessary, will then be required of you. If the source of contamination has been eliminated the levels of metals in the groundwater should be reduced. If there is an indication of a continual source of contamination, more extensive studies will have to be conducted to locate the source. Recommendations and actions will then be required to eliminate that source. Barium, Cyanide and Selenium will be included in the next sampling to help verify the containment of the metals found in the smaller lagoon.

Monitoring will continue on the discharge point of the runoff from the roof. Elevated levels of copper, aluminum and iron were noted in the September sampling. There is some concern that metals are or have been escaping through the roof exhaust system. Such metals could then settle on the roof, mix with rain water and be discharged into the marsh area south of your facility.

Recommendation of a study of the effects of past lagoon overflows on Waterbury Lake is being considered. Such a study could result in further recommendations for remedial action.

As previously discussed, you have agreed to notify our office, by letter, when you have completed filling in the old lagoon, with clean fill. Please include any future plans for the area i.e. seeding, etc.

Your cooperation and efforts to clean up the lagoon contamination has been appreciated. If you have any questions, please do not hesitate to contact me. Thank you.

Sincerely,
GROUNDWATER QUALITY DIVISION

Lynne King
DETROIT DISTRICT OFFICE
(313) 368-3335

LK:pf

cc: Merle Crow
Drew Gabel
Oscar Boyea
Hakim Shakir
Tom Maki

MICHIGAN DEPARTMENT OF NATURAL RESOURCES

INTEROFFICE COMMUNICATION

October 13, 1986

TO: Steve Cunningham, SAU

FROM: Oladipo Oyinsan, GWQD-Detroit

Re: Hi-Mill Mfg. Co.
SAS Location # 63-03N-07E-23AB

I made an inspection of the above facility on September 26, 1986 and talked to Mr. Richard Beard.

Facility does not discharge waste into the ground anymore. The old lagoon has been removed and filled by the company several years ago. It is their understanding that they have corrected their contamination problem.

It is my opinion that before recommending nomination to the National Priorities List (NPL), DNR should sample the monitoring wells installed on site and notify the facility of our intentions. Because they have been cooperative in the past, we should give them an opportunity to initiate any remedial actions necessary if they are willing.

Let us see if we can arrange a meeting with the facility within the near future. Give me a call to arrange for this at your convenience.

OO:js

cc: D. Dennis
H. Shakir
V. Burgess

COMMENTS RELATING TO THE
INCLUSION OF THE
HI-MILL MANUFACTURING COMPANY SITE
IN THE NATIONAL PRIORITIES LIST

TECHNA CORPORATION

Exhibit 3

TECHNA CORPORATION

Knowledge, and the Creativity to Use It

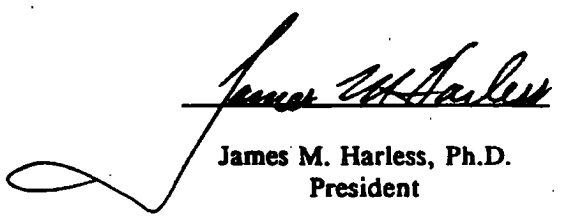
P.O. Box 1087 Ann Arbor, Michigan 48106 (313) 572-1390

COMMENTS RELATING TO THE INCLUSION OF THE HI-MILL MANUFACTURING COMPANY SITE IN THE NATIONAL PRIORITIES LIST

Prepared for:

Mr. Jack D. Shumate
Butzel Long Gust Klein & Van Zile
1650 First National Building
Detroit, Michigan 48226

Prepared by:



James M. Harless, Ph.D.
President

August 26, 1988

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COMMENTS RELATING TO THE INCLUSION OF HI-MILL MANUFACTURING COMPANY SITE IN THE NATIONAL PRIORITIES LIST

1.0 INTRODUCTION

Hi-Mill Manufacturing Company (Hi-Mill) located in Highland Township, Michigan, has been nominated for action under CERCLA/SARA and inclusion in the National Priorities List as a result of evaluations performed by the USEPA under the CERCLA Hazard Ranking System (HRS). Elevated levels of metals have been measured in shallow perched water, surface water (adjacent marsh) and marsh sediments near the site by the Michigan Department of Natural Resources (MDNR).

The Hi-Mill site lies south of a major state highway and north of a small marsh/wetland (Appendix A). The company has fabricated tubular copper, aluminum and brass parts since approximately 1946. Process waste waters from metal finishing operations were discharged to unlined lagoons south of the production building until approximately 1978, at which time the discharges were terminated. The residual water and sludges were removed from the lagoons in 1983 under the oversight of the MDNR.

The results of several investigations undertaken by the MDNR between 1978 and 1984 indicated that elevated levels of metals were present in water and sediment samples collected from the wetland and in samples collected from a near-surface perched water strata at the site. A biological investigation of the wetland/marsh did not reveal evidence that flora or fauna had been harmed by the effluents.

In 1987 the USEPA calculated an HRS score of 49.54 for the site, and then initiated regulatory action under CERCLA/SARA. However, when that score was calculated, the scoring process did not include appropriate consideration and evaluation of all relevant data which were available to USEPA. As a result, there were inaccuracies and errors in the application of HRS scoring guidelines. In addition, the HRS scoring process failed to consider the reduction of environmental impairment risk through prior remedial actions. Therefore, the HRS score is higher than appropriate. When properly scored, it is clear that the subject site does not warrant USEPA actions under CERCLA/SARA. These conclusions are further explained in the following sections.

2.0 HRS SCORING

Review of the October 1987 HRS scoring package (Ref. 1) has revealed scoring inconsistencies and errors in both the Ground Water Route Work Sheet and the Surface Water Route Work Sheet. The ground water route score was mistakenly based on data from two different saturated zones, and the surface water score was partially based on an improper usage assumption for the affected surface water. The result of these inconsistencies and errors is a final HRS score (S_M) that is higher than warranted by the facts and circumstances at the Hi-Mill site. Discussions of the appropriate scoring for the two route work sheets and the Work Sheet for Computing S_M are presented below.

2.1 Ground Water Route Work Sheet

The October, 1987 Ground Water Route score (Sgw) was determined to be 84.62 (Ref. 1); however, this score was improperly assigned because data associated with two different subsurface, saturated zones were combined in the route evaluation. The two saturated zones in question, 1) perched water near the ground surface and 2) a deeper, usable aquifer 45' - 60' below ground level, must be considered separately because they are separated by low permeability clays (ref.1, pg. 3) and there is no evidence of conectivity between the zones.

The Line 1, "Observed Release", score of 45 was assigned for the perched water lying approximately two to six feet beneath the existing grade. This score was based on the results of a 1982 MDNR hydrogeological study (Ref. 2) performed at the site. Elevated levels of metals (Cr, Cu, Al, and Zn) were measured in the perched water layer lying south and southeast of the Hi-Mill property. According to the guidelines for using the HRS (40 CFR 300, App. A), this constitutes evidence of release to the perched water layer. Since the MDNR study did not investigate ground water below a depth of 6.9', the results of the study are not applicable to deeper saturated zones.

The scoring for Line 5, "Targets", was developed for deeper, usable groundwater supplies. Based on local drinking water well logs (Appendix D), these aquifers are in saturated zones that 1) lie between 45' and 60' deep and 2) lie at depths greater than 100', and they are separated from the contaminated perched water by intervening clay layers of low permeability. These ground water supplies are indeed used for drinking by many households and businesses within a three mile radius of the Hi-Mill site. There is currently no evidence to indicate that these aquifers are contaminated or that they can be contaminated by the "observed release" (metals in the perched water lying near the surface). On the contrary, there was evidence available at the time of scoring to show that the deeper, usable aquifers were not contaminated by the "observed release". Additional analysis data collected by the Michigan Department of Health (July 1988) confirms the continuing absence of contamination in these aquifers (see Section 2.1.2).

2.1.1 Perched Water as Aquifer of Concern

If the perched water layer is used as the basis ("aquifer of concern" - 40 CFR 300, App. A) for preparing the work sheet, then the "Observed Release" score of 45 on the October, 1987, HRS Work Sheet (Ref. 1) is valid.

The scores for the components of Line 4 (Ref. 1) are also valid, and the total line score is 22.

However, since this saturated zone is not and cannot be used for human consumption due to low quality and yield, the Line 5 "Ground Water Use" score, "Distance to Nearest Well/Population Served" score, and "Total Targets Score" must all be zero (0).

Multiplication of Lines 1, 4 and 5 then results in a value of zero (0) and a final S_{gu} score of zero (0).

2.1.2 Uppermost Usable Saturated Zone as Aquifer of Concern

If the uppermost usable aquifer, lying between 45' and 60' deep, is used as the basis for preparing the work sheet, the "observed Release" score must be zero (0) since there is no chemical evidence that this aquifer is contaminated. In fact, all available evidence indicates that it is not contaminated. Several samples of ground water from Hi-Mill's production wells have been collected and analyzed for metals during the period 1972 - 1988. The results of these analyses are summarized in the table below:

Date	Sampling Agency	Results
April, 1972	MDNR (Ref. 3)	Cu - 0.38 mg/l "All other parameters ... were normal."
April, 1978	MDNR (Ref. 4)	"No contamination of the company's well was indicated, ..."
July, 1988	Oakland County Health Department (Ref.5)	Concentrations of all metal species tested were less than Drinking Water Standards and MCL limits; since concentrations of the two detected VOA species are near detection limits and no QC samples were analyzed, the VOA data is unreliable

These data show that each time samples from the wells have been analyzed, the concentrations of all metals have been below Primary and Secondary Drinking Water Limits and Maximum Contaminant Level limits; therefore, there is no evidence of contamination of the deeper aquifers, even near the source of the surficial contamination.

Since the score for Line 1 is zero (0), Lines 2, 3 and 4 must be evaluated. In Line 2, the "Depth to Aquifer of Concern" is 45' - 60' (Appendix B), resulting in a score of 2. The "Net Precipitation" is zero (0) based on a normal annual precipitation of approximately 32 inches (40 CFR 300, App. A, Figure 5) and a mean annual lake evaporation of 30 - 32" (40 CFR 300, App. A, Figure 4); thus the score for this component is also zero (0). The score for "Permeability of the Unsaturated Zone (or intervening geological formation" (40 CFR 300, App. A, 3.2) should also be zero (0) due to the presence of "low permeability clays" (Ref. 1, pg. 3) encountered by the MDNR at depths of 1' and extending beyond borehole termini at depths of 4.5' to 7' below the existing ground surface. Since the "Physical State" of the contaminant, waste water, is liquid, the score for this component should be 3. The total Line 2 score should then be 7.

The waste water lagoon at the site was not lined. Therefore, the score for Line 3 is 3.

The scores for the components of Line 4 (Ref. 1) are appropriate, and the total score is 22.

The score for Line 5, "Ground Water Use", would be 3 because the ground water is used for human consumption. The score for "Distance to Nearest Well/Population Served" has been determined to be 35. This score is based on the following data: 1) the distance to the nearest well

(on-site) is <2000', and 2) based on local well logs (Appendix B), approximately 60% of the potential 13,604 people served by local ground water sources (Ref. 1) draw water from the "aquifer of concern" lying at a depth of 45' - 60'. Thus, the total Line 5 score should be 44.

If the final ground water route score is calculated as described in the work sheet, with the above values, the value of S_{gw} is 39.49.

2.2 Surface Water Route Work Sheet

The October, 1987 Ground Water Route score (Sgw) was determined to be 13.54 (Ref. 1); however, this score is inaccurate because the improper score was assigned to Line 5, "Surface Water Use". All other line scores appear to be appropriate.

The surface water of concern is a marsh/wetland area lying southeast of the Hi-Mill facility; it lies with a State of Michigan's Highland Recreational Area. The wetland has a typical maximum depth of 2.5' (Ref. 6), but water levels may be highly variable (Appendix ... - Historical Aerial Photos). An aquatic organisms study conducted by the MDNR (Ref. 6) did not discover any fish in the subject marsh; this is consistent with the shallow, highly variable water levels in the marsh. Therefore, this surface water is not adapted, nor is used, for 1) commercial or industrial purposes, 2) irrigation ... or recreational activities such as "fishing, boating, swimming" (40 CFR 300, App. A, 4.5), or 3) drinking water.

Although the nearby Waterbury Lake could be used for recreational activities, there is neither evidence nor reason for suspicion that it is contaminated. Examination of aerial photographs (Appendix I) reveals no surface water connection between the marsh and Waterbury Lake. This conclusion was confirmed by MDNR investigators in a 1984 study (Ref. 6) of the site. This study also concluded that Waterbury Lake "was not impacted by Hi-Mill surface discharges"; in fact, sediments from Waterbury Lake were used as representative of background for comparison of chemical analysis data (Ref. 6).

Therefore, based on the 1) lack of recreational or commercial use of the marsh and 2) the absence of effect on other surface water bodies from the Hi-Mill discharges, the Line 5 "Surface Water Use" score should be zero (0). This would result in a Line 5 total score of 6. Multiplying Lines 2, 3, 4, and 5 would then result in a Line 6 value of 4356. The resulting S_{sw} score is 6.77.

2.3 Work Sheet for Computing S_M

Revised values for S_M have been calculated based on the more accurate assessment strategies and information presented above. The value for S_{sw} was assumed to be 6.77 for all calculations. Two different calculations of S_M were performed using data from the two ground water assumptions described above. Thus, values were determined for the cases where 1) the perched water and 2) the usable, deeper groundwater was the "aquifer of concern". The results of these calculations are presented in the following table:

Aquifer of Concern	S_{gw}	S_{sw}	S_a	S_M
Mixed - 10/87 HRS	84.62	13.54	NA	49.54
Perched Water	0.0	6.77	NA	3.91
Usable, Deeper Aquifer	39.49	6.77	NA	23.16

Whereas the S_M value was calculated at 49.54 in the October 1987 HRS scoring, the values of S_M calculated from the more refined data presented herein are 3.91 and 23.16. In both determinations S_M are less than 28.5, the threshold value for CERCLA action consideration under normal circumstances. The only way that an HRS score of >28.5 can be obtained from the Hi-Mill work sheets is to assume that there has been a documented release to the aquifer at 45' - 60' below the ground surface; there is no evidence to support such an assumption. All evidence is to the contrary.

3.0 SITE ACTIVITIES AND CONDITIONS

Previous remedial activities at the Hi-Mill site have resulted in removal of the waste water lagoons, primary sources of metals contamination. In September 1983 the MDNR recommended that Hi-Mill remove and dispose of the remaining waste water and sludges in the lagoons (Ref. 7). This was performed in November 1983 with oversight by the MDNR. All sludges and sediments were removed down to clay, and the entire area was filled with clean fill (Ref. 8). All activities were apparently performed to the satisfaction of the MDNR.

Based on 1) the removal of the lagoons and related contaminated waters and sludges and 2) the lack of evidence for additional sources on-site, the Hi-Mill site does not appear to present an imminent danger to human health or the environment. Past activities appear to have resulted in potential contamination of shallow perched waters and the adjoining wetland.

4.0 CONCLUSION

The evidence does not support inclusion of the Hi-Mill site on the National Priorities List or implementation of USEPA actions under CERCLA/SARA. If the site is scored properly according to HRS guidelines, the HRS score is below the 28.5 threshold under all circumstances. Past remedial activities have removed major contaminant sources which could pose an imminent danger.

Hi-Mill has committed to perform an extensive site assessment program to fully characterize the extent of contamination in subsurface waters and in the adjoining marsh. If significant contamination is discovered, a remedial action program will be designed and implemented. All of these activities will be performed under the continuing oversight of the MDNR.

It thus appears that expenditure of time, effort and funds by the USEPA is not justified. These resources can be more effectively applied to sites which truly present a significant risk to human health and the environment.

5.0 TECHNA CORPORATION QUALIFICATIONS

Techna Corporation is an environmental services firm specializing in site investigations, site remediation activities and environmental and chemical safety regulations compliance. Techna's highly trained and experienced staff of scientists and engineers have performed numerous site investigation and risk assessment programs involving the technical and regulatory issues described in this report.

Resumes of key technical staff are presented in Appendix L, and summaries of related projects conducted by Techna are attached in Appendix M.

REFERENCES

1. HRS Scoring Package for Hi-Mill Manufacturing dated 6/23/86 and with revision date of 10/13/87 (see Appendix B)

2. Sibo, Kathleen, "A Hydrogeological Study of the Vicinity of HiMill Manufacturing, Highland, Michigan", Michigan Department of Natural Resources, August 31, 1982. (see Appendix D)

3. Wilson, Ron, Interoffice Communication to Problem Evaluation Committee, Michigan Department of Natural Resources, March 1, 1978. (see Appendix E)

4. Grant, James and Richard Lundgren, "Investigation of Hi-Mill Manufacturing Treatment Facility, Vicinity of Highland, Michigan, April 26, 1978," Michigan Department of Natural Resources, November 14, 1978. (see Appendix F)

5. Parsons, Julie M., Letter to Mr. Dick Beard Detailing Results of Process Well Testing at Hi-Mill Manufacturing Company, Michigan Department of Public Health, August 22, 1988. (see Appendix G)

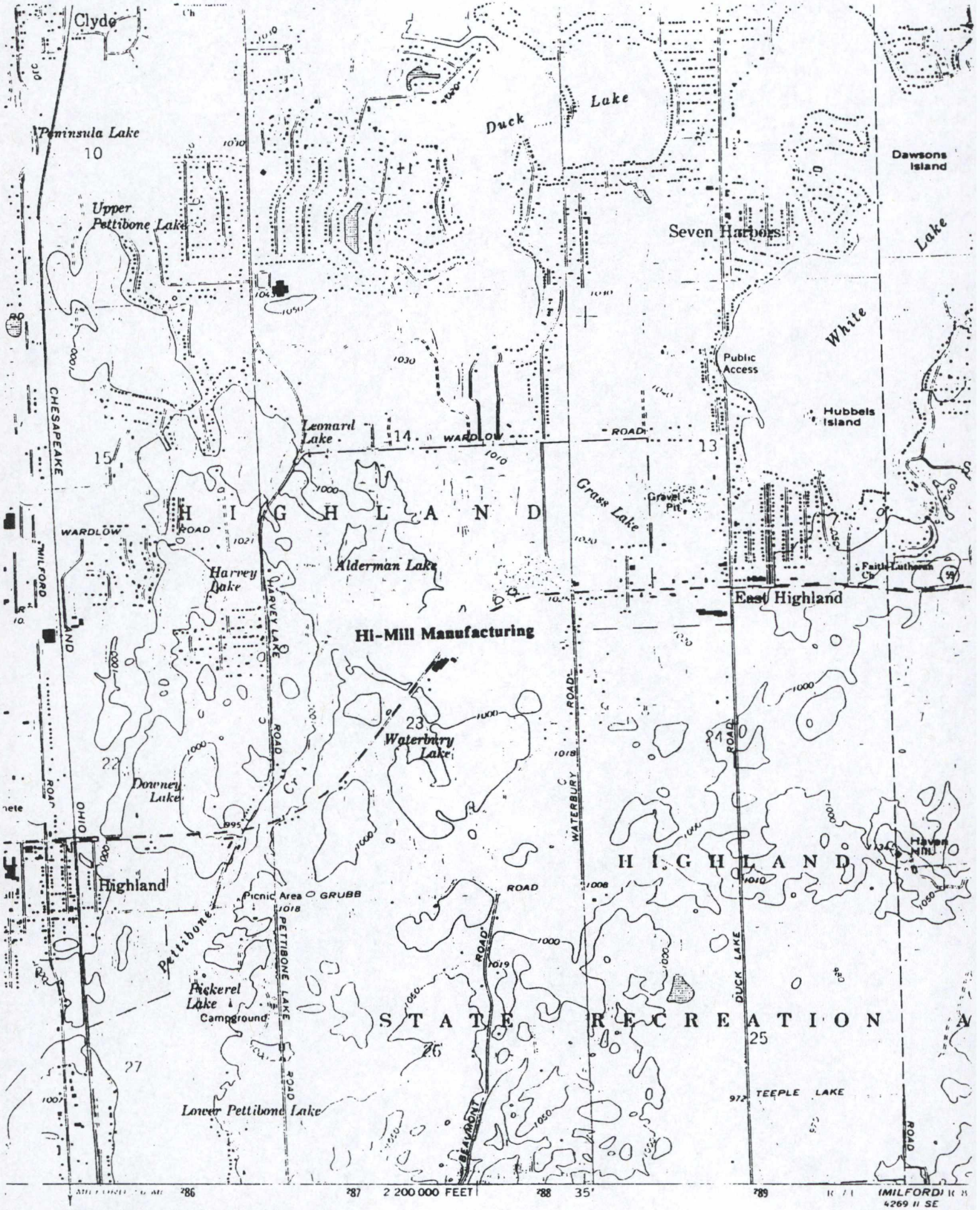
6. Surface Water Quality Division, "A Biological and Water and Sediment Chemistry Survey of Waterbury Lake and Adjacent Marsh, Oakland County, Michigan, April 26, 1984," Michigan Department of Natural resources, April 26, 1984. (see Appendix H)

7. King, Lynne, Letter to Mr. Bob Beard Concerning Recommendations for Remedial Action at Hi-Mill Manufacturing Company, Michigan Department of Natural Resources, September 8, 1983. (see Appendix J)

8. Lee, Lonnie, "Site Description/Executive Summary," Michigan Department of Natural Resources, October 11, 1984. (see Appendix K)

APPENDIX A

SITE LOCATION MAP



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APPENDIX B

HRS SCORING PACKAGE
(REF. 1)

Facility name: Hi-Mill Manufacturing

Location: 1074 Highland Rd., Highland, MI 48031

EPA Region: Five

Person(s) in charge of the facility: Mr. Robert Beard - President, Hi-Mill

Name of Reviewer: Paul Andersen (RPI) Date: 6/23/86

General description of the facility: Kathleen J. Gray (FIT)

(For example: landfill, surface impoundment, pile, container; types of hazardous substances; location of the facility; contamination route of major concern; types of information needed for rating; agency action, etc.)

Waste water from the manufacture of aluminum, copper and brass parts was deposited in an on-site seepage lagoon. The groundwater has been contaminated with copper and an adjacent marshy area has also been contaminated due to overflows from the lagoon. wastewater and sludge have been removed and the lagoon is now filled with sand.

Scores: $S_M = 49.54 \; S_{gw} = 84.62 \; S_{sw} = 13.54 \; S_a = 0$)

$S_{FE} = NA$

$S_{DC} = 0$

FIGURE 1
HRS COVER SHEET

PA

Robert E. Peterson

NJDEP

Ground Water Route Work Sheet					
Rating Factor	Assigned Value (Circle One)	Multi-plier	Score	Max. Score	Ref. (Section)
1 Observed Release	0 (45)	1	45	45	3.1
If observed release is given a score of 45, proceed to line 4. If observed release is given a score of 0, proceed to line 2.					
2 Route Characteristics					3.2
Depth to Aquifer of Concern	0 1 (2) 3	2		6	
Net Precipitation	(0) 1 2 3	1		3	
Permeability of the Unsaturated Zone	0 1 2 3	1		3	
Physical State	0 1 2 3	1		3	
Total Route Characteristics Score			N/A	15	
3 Containment	0 1 2 3	1	N/A	3	3.3
4 Waste Characteristics					3.4
Toxicity/Persistence	0 3 6 9 12 15 (18)	1	18	18	
Hazardous Waste Quantity	0 1 2 3 (4) 5 6 7 8	1	4	8	
Total Waste Characteristics Score			22	26	
5 Targets					3.5
Ground Water Use	0 1 2 (3)	3	9	9	
Distance to Nearest Well/Population Served	0 4 6 8 10 12 16 18 20 24 30 32 35 (40)	1	40	40	
Total Targets Score			49	49	
6 If line 1 is 45, multiply 1 x 4 x 5 If line 1 is 0, multiply 2 x 3 x 4 x 5			48510	57,330	
7 Divide line 6 by 57,330 and multiply by 100		S_{gw} = 84.62			

FIGURE 2
GROUND WATER ROUTE WORK SHEET

Surface Water Route Work Sheet

Rating Factor	Assigned Value (Circle One)	Multiplier	Score	Max. Score	Ref. (Section)
1 Observed Release	0 45	1		45	4.1
If observed release is given a value of 45, proceed to line 4. If observed release is given a value of 0, proceed to line 2.					
2 Route Characteristics					4.2
Facility Slope and Intervening Terrain	(0) 1 2 3	1	0	3	
1-yr. 24-hr. Rainfall	0 1 (2) 3	1	2	3	
Distance to Nearest Surface Water	0 1 2 (3)	2	6	6	
Physical State	0 1 2 (3)	1	3	3	
Total Route Characteristics Score			11	15	
3 Containment	0 1 2 (3)	1	3	3	4.3
4 Waste Characteristics					4.4
Toxicity/Persistence	0 3 6 9 12 15 (18)	1	18	18	
Hazardous Waste Quantity	0 1 2 3 (4) 5 6 7 8	1	4	8	
Total Waste Characteristics Score			22	26	
5 Targets					4.5
Surface Water Use	0 1 (2) 3	3	6	9	
Distance to a Sensitive Environment	0 1 2 (3)	2	6	6	
Population Served/Distance to Water Intake Downstream	(0) 4 6 8 10 12 16 18 20 24 30 32 35 40	1	0	40	
Total Targets Score			12	55	
6 If line 1 is 45, multiply 1 x 4 x 5. If line 1 is 0, multiply 2 x 3 x 4 x 5			8712	64,350	
7 Divide line 6 by 64,350 and multiply by 100		S_{SW} = 13.54			

FIGURE 7
SURFACE WATER ROUTE WORK SHEET

Air Route Work Sheet					
Rating Factor	Assigned Value (Circle One)	Multiplier	Score	Max. Score	Ref. (Section)
[1] Observed Release	(0) 45	1	0	45	5.1
Date and Location:					
Sampling Protocol:					
If line [1] is 0, the S_a = 0. Enter on line [5]. If line [1] is 45, then proceed to line [2].					
[2] Waste Characteristics					5.2
Reactivity and Incompatibility	0 1 2 3	1		3	
Toxicity	0 1 2 3	3		9	
Hazardous Waste Quantity	0 1 2 3 4 5 6 7 8	1		8	
	Total Waste Characteristics Score		N/A	20	
[3] Targets					5.3
Population Within 4-Mile Radius	0 9 12 15 18 21 24 27 30	1		30	
Distance to Sensitive Environment	0 1 2 3	2		6	
Land Use	0 1 2 3	1		3	
	-- Total Targets Score		N/A	39	
[4] Multiply [1] x [2] x [3]			0	35,100	
[5] Divide line [4] by 35,100 and multiply by 100		S_a = 0			

FIGURE 9
AIR ROUTE WORK SHEET

	S	S^2
Groundwater Route Score (S_{gw})	84.62	7160.54
Surface Water Route Score (S_{sw})	13.54	183.33
Air Route Score (S_a)	—	—
$S_{gw}^2 + S_{sw}^2 + S_a^2$		7343.88
$\sqrt{S_{gw}^2 + S_{sw}^2 + S_a^2}$		85.70
$\sqrt{S_{gw}^2 + S_{sw}^2 + S_a^2} / 1.73 = S_M =$		49.54

FIGURE 10
WORKSHEET FOR COMPUTING S_M

Fire and Explosion Work Sheet					
Rating Factor	Assigned Value (Circle One)	Multiplier	Score	Max. Score	Ref. (Section)
1 Containment	1 3	1	N/A	3	7.1
2 Waste Characteristics					7.2
Direct Evidence	0 3	1		3	
Ignitability	0 1 2 3	1		3	
Reactivity	0 1 2 3	1		3	
Incompatibility	0 1 2 3	1		3	
Hazardous Waste Quantity	0 1 2 3 4 5 6 7 8	1		8	
Total Waste Characteristics Score			N/A	20	
3 Targets					7.3
Distance to Nearest Population	0 1 2 3 4 5	1		5	
Distance to Nearest Building	0 1 2 3	1		3	
Distance to Sensitive Environment	0 1 2 3	1		3	
Land Use	0 1 2 3	1		3	
Population Within 2-Mile Radius	0 1 2 3 4 5	1		5	
Buildings Within 2-Mile Radius	0 1 2 3 4 5	1		5	
Total Targets Score			N/A	24	
4 Multiply 1 x 2 x 3			N/A	1,440	
5 Divide line 4 by 1,440 and multiply by 100		S_{FE} = N/A			

FIGURE 11
FIRE AND EXPLOSION WORK SHEET

Direct Contact Work Sheet					
Rating Factor	Assigned Value (Circle One)	Multiplier	Score	Max. Score	Ref. (Section)
1 Observed Incident	(0) 45	1	0	45	8.1
If line 1 is 45, proceed to line 4 If line 1 is 0, proceed to line 2					
2 Accessibility	(0) 1 2 3	1	0	3	8.2
3 Containment	0 15	1	N/A	15	8.3
4 Waste Characteristics Toxicity	0 1 2 3	5	N/A	15	8.4
5 Targets					8.5
Population Within a 1-Mile Radius	0 1 2 3 4 5	4		20	
Distance to a Critical Habitat	0 1 2 3	4		12	
Total Targets Score			N/A	32	
6 If line 1 is 45, multiply 1 x 4 x 5 If line 1 is 0, multiply 2 x 3 x 4 x 5			0	21,600	
7 Divide line 6 by 21,600 and multiply by 100		S_{DC} = 0			

FIGURE 12
DIRECT CONTACT WORK SHEET

June 28, 1982

DOCUMENTATION RECORDS
FOR
HAZARD RANKING SYSTEM

INSTRUCTIONS: The purpose of these records is to provide a convenient way to prepare an auditable record of the data and documentation used to apply the Hazard Ranking System to a given facility. As briefly as possible summarize the information you used to assign the score for each factor (e.g., "Waste quantity = 4,230 drums plus 800 cubic yards of sludges"). The source of information should be provided for each entry and should be a bibliographic-type reference that will make the document used for a given data point easier to find. Include the location of the document and consider appending a copy of the relevant page(s) for ease in review.

FACILITY NAME: Hi-Mill Manufacturing

LOCATION: 1074 Highland Road, Highland, MI 48031

QT
Robert E. [illegible]
[illegible] 3/87

GROUND WATER ROUTE

1 OBSERVED RELEASE

Contaminants detected (5 maximum):
Down gradient wells HM3 and HM4 showed copper concentrations greater than 10 times the copper concentrations detected in the upgradient well HM6. Reference 1, pp. 5,6, and 9

well	HM3	HM4	HM6
conc. Cu (µg/l)	480	840	30

Rationale for attributing the contaminants to the facility:
Chromium, zinc, and Aluminum were also detected in the groundwater downgradient at levels elevated when compared to upgradient. These levels however are not high enough to include them in the observed release.
Samples taken in April, 1984 show a continued release of copper from the site (Ref. 15)

Lab number	37870	37871	37873
well	HM3	HM4	HM6
conc. Cu (µg/l)	1040	565	20

2 ROUTE CHARACTERISTICS

Depth to Aquifer of Concern

Name/description of aquifers(s) of concern:
The area of the site in Oakland County is underlain by a complex jumble of clay, sand and gravel. Relative to it's capacity to yeild water, outwash is the most important glacial deposit in Oakland County (Ref 16 p 93). This material commonly contains lenses of well sorted sand and gravel that provide large quantities of water. (Ref 16, p 93). Based on studies performed on the permeability

Depth(s) from the ground surface to the highest seasonal level of the saturated zone [water table(s)] of the aquifer of concern: (See page 2A)
N/A

Depth from the ground surface to the lowest point of waste disposal/ storage:
N/A

Depth to Aquifer of Concern (cont.)

of this aquifer system, it can be shown that these beds or lenses can have interchange of water and are therefore connected. Ref 16, Fig 69, 70, 71 & 72 show the permeability of the glacial deposits in 50 foot intervals. In the area of the site the permeability at all intervals is medium to high. A representative sampling of well logs (Ref 6) shows everyone to be drawing from glacial deposits in the depth range studied in Ref 16 pages 91 - 106.

Net Precipitation

Mean annual or seasonal precipitation (list months for seasonal):
N/A

Mean annual lake or seasonal evaporation (list months for seasonal):
N/A

Net precipitation (subtract the above figures):
N/A

Permeability of Unsaturated Zone

Soil type in unsaturated zone:
N/A

Permeability associated with soil type:
N/A

Physical State

Physical state of substances at time of disposal (or at present time for generated gases):
N/A

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3 CONTAINMENT

Containment

Method(s) of waste or leachate containment evaluated:

N/A

Method with highest score:

N/A

4 WASTE CHARACTERISTICS

Toxicity and Persistence

Compound(s) evaluated: Copper, Chromium, and Aluminum. Ref. 1 pgs. 5, 6, and 9

Compound	Toxicity	Reference	Persistence	Reference	Matrix Score
Copper	3	Ref 2, pg [illegible]	3	Ref 3, 47 FR 31229	18
Chromium	3	Ref 2, pg 711	3	Ref 3, 47 FR 31229	18

Compound with highest score:

Copper and chromium both score highest.

Score = 18

Hazardous Waste Quantity

Total quantity of hazardous substances at the facility, excluding those with a containment score of 0 (Give a reasonable estimate even if quantity is above maximum):

34,400 gallons of contaminated sludge were removed from the lagoon (Ref. 4). An ananylis of the sludge showed that it contained chromium, copper, nickel and zinc (Ref 5).

Basis of estimating and/or computing waste quantity:

34,400 gals (Ref 4) ÷ $\frac{50 \text{ gal}}{\text{drum}}$ = 688 drums.

Score = 4

* * *

RE [illegible] 11/3/87

5 TARGETS

Ground Water Use

Use(s) of aquifer(s) of concern within a 3-mile radius of the facility:
There are no municipal supply systems serving residences in the three mile radius. The residences and businesses use groundwater as their sole source of drinking water. Ref. 13 lists all the public water supplies in Oakland Co. None are located in the 3-mile radius. The pop. derives its drinking water from private wells all in the aquifer of concern. (Ref.

Distance to Nearest Well

Score = 3.

Location of nearest well drawing from aquifer of concern or occupied building not served by a public water supply:
There are two wells on-site used for drinking water and process water. One was found to be contaminated with Cu (Ref. 7). The wells are between 60 and 80 feet deep and thus draw from the aquifer of concern - Ref. 4
Private wells w/1 mi at least one (Ron Thorin 2558 Lincoln
Distance to above well or building:
well is on-site. Ref 7, 4

Score = 4

Population Served by Ground Water Wells Within a 3-Mile Radius

Identified water-supply well(s) drawing from aquifer(s) of concern within a 3-mile radius and populations served by each:
From the representative sample of well logs (Ref. 6) it appears that all wells are screened in the glacial deposits aquifer. 3580 houses were counted on the Topographical Map (Ref. 8).
$(3580 \text{ houses})\left(3.8 \frac{\text{people}}{\text{house}}\right) = 13,604 \text{ people.}$ *
Computation of land area irrigated by supply well(s) drawing from aquifer(s) of concern within a 3-mile radius, and conversion to population (1.5 people per acre):
No farmland is irrigated in the 3 mile radius (Ref. 9).

Total population served by ground water within a 3-mile radius:
Total Population served = 13,604
Score = 5

Matrix Score = 40

* The population is probably higher since there are 2 trailer parks west of the site within the 3 mile radius. These people were not counted.

X

Ref

SURFACE WATER ROUTE

1 OBSERVED RELEASE

Contaminants detected in surface water at the facility or downhill from it (5 maximum): Sediments in waterbury Lake were found to be contaminated with Chromium, Copper, Nickel, and Lead (Ref. 10, page 7), but this data may not be used to document a surface water release since no background sample was taken.

Rationale for attributing the contaminants to the facility:
Score = 0

* * *

2 ROUTE CHARACTERISTICS

Facility Slope and Intervening Terrain

Average slope of facility in percent:
slope calculated from the difference in elevation at HM6 and HM2 given on page 8 of Reference 1

$$\% \text{ slope} = \frac{1009.9 - 1006.5}{500} \times 100 = 0.78\%$$

Name/description of nearest downslope surface water:
Reference 8

The wetland on the ENE sides of the Hi Mill property would recieve all runoff from the site.

Average slope of terrain between facility and above-cited surface water body in percent:
As shown on Ref 8, the facility and the adjacent marsh lie within the same 10 foot contour interval. The slope of the intervening terrain cannot be determined and is therefore considered to be less than 3%. Ref 8, Ref 1

Is the facility located either totally or partially in surface water?
No Ref. 8

PMF
10/13/87

Is the facility completely surrounded by areas of higher elevation?
No. Reference 8.

Score = 0

1-Year 24-Hour Rainfall in Inches

2.15 inches
Ref. 3 - 47FR 31233
Score = 2

Distance to Nearest Downslope Surface Water

The onsite lagoon containing the hazard waste is approximately 40 ft from the state Recreation area. See Ref 1 Fig 1 and Ref 8.

Physical State of Waste

Liquid. Ref. 4, 5
Score = 3

* * *

3 CONTAINMENT

Containment

Method(s) of waste or leachate containment evaluated:
Leaking surface Impoundment. The lagoon on-site has been observed to be overflowing into the adjacent marsh. Ref. 11, page 1.

Method with highest score:
Leaking surface Impoundment.
Score = 3

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4 WASTE CHARACTERISTICS

Toxicity and Persistence

Compound(s) evaluated
Marsh sediments show high concentrations of Chromium, Copper, Nickel and Lead.

Compound	Toxicity	Reference	Persistence	Reference	Matrix Score
Cr	3	2, p 751	3	3, 47FR 31224	18
Cu	3	2, p 806	3	"	18
Ni	1	2, p 1752	3	"	12
Pb	3	2, p 1685	3	"	18

Compound with highest score:
Copper, Chromium, and Lead all score highest

Score = 18

Hazardous Waste Quantity

Total quantity of hazardous substances at the facility, excluding those with a containment score of 0 (Give a reasonable estimate even if quantity is above maximum):
688 drums

Basis of estimating and/or computing waste quantity:
See Groundwater Route, page 4 of this documentation record

Score = 4

* * *

5 TARGETS

Surface Water Use

Use(s) of surface water within 3 miles downstream of the hazardous substance:
The wetland area which would receive site runoff is part of the Highland State Recreation Area. Specifically, it is used for open hunting Ref 17.
Score: 2

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Is there tidal influence?

No

Distance to a Sensitive Environment

Distance to 5-acre (minimum) coastal wetland, if 2 miles or less:

N/A

Distance to 5-acre (minimum) fresh-water wetland, if 1 mile or less:

Since the hazardous substance was discharged directly to the wetland, The distance from the hazardous substance to the wetland is zero, Ref. 11, Ref. 8

Distance to critical habitat of an endangered species or national wildlife refuge, if 1 mile or less:

No critical habitat of endangered species or national wildlife refuge exist in Oakland county.
Reference 14.

Score = 3

Population Served by Surface Water

Location(s) of water-supply intake(s) within 3 miles (free-flowing bodies) or 1 mile (static water bodies) downstream of the hazardous substance and population served by each intake:

There are no drinking water intakes in the surface water.
Ref 13

Computation of land area irrigated by above-cited intake(s) and conversion to population (1.5 people per acre):
There are no irrigation intakes in the nearby surface water (Ref. 9).

Total population served:
zero

Name/description of nearest of above water bodies:
N/A

Distance to above-cited intakes, measured in stream miles.
N/A
Score = 0

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AIR ROUTE

1 OBSERVED RELEASE

Contaminants detected:
No release has been documented
Score = 0

Date and location of detection of contaminants
N/A

Methods used to detect the contaminants:
N/A

Rationale for attributing the contaminants to the site:
N/A

* * *

2 WASTE CHARACTERISTICS

Reactivity and Incompatibility

Most reactive compound:
N/A

Most incompatible pair of compounds:
N/A

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Toxicity

Most toxic compound:
N/A

Hazardous Waste Quantity

Total quantity of hazardous waste:
N/A

Basis of estimating and/or computing waste quantity:
N/A

* * *

3 TARGETS

Population Within 4-Mile Radius

Circle radius used, give population, and indicate how determined:

0 to 4 mi 0 to 1 mi 0 to 1/2 mi 0 to 1/4 mi
N/A

Distance to a Sensitive Environment

Distance to 5-acre (minimum) coastal wetland, if 2 miles or less:
N/A

Distance to 5-acre (minimum) fresh-water wetland, if 1 mile or less:
N/A

Distance to critical habitat of an endangered species, if 1 mile or less:

N/A

Land Use

Distance to commercial/industrial area, if 1 mile or less:

N/A

Distance to national or state park, forest, or wildlife reserve, if 2 miles or less:

N/A

Distance to residential area, if 2 miles or less:

N/A

Distance to agricultural land in production within past 5 years, if 1 mile or less:

N/A

Distance to prime agricultural land in production within past 5 years, if 2 miles or less:

N/A

Is a historic or landmark site (National Register or Historic Places and National Natural Landmarks) within the view of the site?

N/A

FIRE AND EXPLOSION

No fire or explosion hazard has been declared at the site by a state or Federal Fire Marshal. Route will not be scored.

1 CONTAINMENT

Hazardous substances present:

N/A

Type of containment, if applicable:

N/A

* * *

2 WASTE CHARACTERISTICS

Direct Evidence

Type of instrument and measurements:

N/A

Ignitability

Compound used:

N/A

Reactivity

Most reactive compound:

N/A

Incompatibility

Most incompatible pair of compounds:

N/A

* * *

Hazardous Waste Quantity

Total quantity of hazardous substances at the facility:
N/A

Basis of estimating and/or computing waste quantity:
N/A

* * *

3 TARGETS

Distance to Nearest Population

N/A

Distance to Nearest Building

N/A

Distance to Sensitive Environment

Distance to wetlands:
N/A

Distance to critical habitat:
N/A

Land Use

Distance to commercial/industrial area, if 1 mile or less:
N/A

Distance to national or state park, forest, or wildlife reserve, if 2 miles or less:

N/A

Distance to residential area, if 2 miles or less:

N/A

Distance to agricultural land in production within past 5 years, if 1 mile or less:

N/A

Distance to prime agricultural land in production within past 5 years, if 2 miles or less:

N/A

Is a historic or landmark site (National Register or Historic Places and National Natural Landmarks) within the view of the site?

N/A

Population Within 2-Mile Radius

N/A

Buildings Within 2-Mile Radius

N/A

DIRECT CONTACT

1 OBSERVED INCIDENT

Date, location, and pertinent details of incident:
There are no documented instances where injury, illness, or death has occured to humans or animals

Score = 0

* * *

2 ACCESSIBILITY

Describe type of barrier(s):
The site is completely fenced and can only be reached by by walking through the manufacturing plant. Ref: 1 (fig 1); Ref: 4
Score = 0

The rest of this route need not be evaluated because a direct contact score of zero and an accessibility score of zero will automatically make the route score zero

3 CONTAINMENT

Type of containment, if applicable:
N/A

* * *

4 WASTE CHARACTERISTICS

Toxicity

Compounds evaluated:
N/A

Compound with highest score:
N/A

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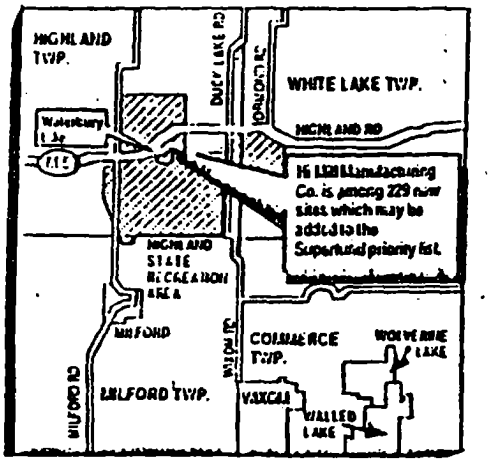
5 TARGETS

Population within one-mile radius

N/A

Distance to critical habitat (of endangered species)

N/A



The Oakland Press/MARK RADEMACHER

Highland plant on toxic list for Superfund

By B.A. MODRACK
Of The Oakland Press

A manufacturing plant near the Highland Recreation Area — which in 1982 dredged a lagoon to remove toxic wastes — is among 229 new sites that may be added to the U.S. Environmental Protection Agency "Superfund" priority list.

An official of the Department of Natural Resources believes water flowing into the Highland Recreation Area may have been contaminated with metals from the plant.

An estimated 14,000 people drink from wells that draw from the ground water within three miles of the site, a DNR official said. There is no known contamination of domestic wells in the area.

Hi-Mill Manufacturing Co. on Highland Road has been on the state list of toxic sites for several years, but has not been included previously on the federal list. If it is actually placed on the list, the site may become eligible for funding for study and cleanup.

Officials of the company were surprised by the EPA action, saying they felt they had complied with all environmental standards when they cleaned out the lagoon and altered their discharge methods.

"It must be minute," said Robert Beard, a vice president of Hi-Mill, of the potential contamination. "I thought we were clean. We had it (the lagoon) scraped out, scooped out. We've done anything that they've asked for and nothing has gone into the ground since then."

Any hazardous m. ial that leaves the building is hauled away by a licensed carrier, Beard said. The cost of the cleanup was approximately $50,000, he said. The plant employs approximately 45 people.

Gerry Nowak, an environmental quality analyst for the Michigan Department of Natural Resources, said the history of the site dates back to 1916.

Between that date and 1982, the plant had been fabricating aluminum, copper and brass on site and had been dipping and discharging wastes into an unlined lagoon, adjacent to Waterbury Lake.

"In addition, they sprayed rinse water in the air as a disposal method," Nowak said.

In 1982, the DNR discovered copper while monitoring wells lower in grade than the site.

Also, Nowak said, contaminated metals were found in the marsh sediments and the water adjacent to the Highland Recreation Area.

"It's that the contaminants have flowed into the recreation area that bothers me," Nowak said.

In 1982, the company was required to remove sludge and contaminated soils from the lagoon, transporting it to a hazardous waste facility.

"They went down to clean clay and used sand to fill the hole," Nowak said. Contaminated water was treated on site.

Current operations include recycling the rinse water, neutralizing the remaining water, and transporting it to a hazardous waste facility.

"The most important piece of information is that an estimated 14,000 people obtain drinking water from private wells within three miles of the site," Nowak said.

LOCAL
The Oakland Press
Wednesday, June 22, 1988 ☆☆☆ 4-3

APPENDIX C

MDNR HYDROGEOLOGICAL STUDY
(REF. 2)

A Hydrogeological Study of the Vicinity of HiMill Manufacturing, Highland, Michigan

Water Quality Division
Groundwater Unit
Kathleen Sibo, Geologist
August 31, 1982

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Appendix

Summary

The HiMill Manufacturing Company, located on M-59 in Highland, Michigan, Oakland County, T3N R7E Section 23, makes fabricated tubing and fittings using copper or aluminum tubing (Legrand assessment July 29, 1980). The HiMill property borders on the Highland State Recreation Area. The HiMill lagoon is adjacent to a marsh connected to Waterbury Lake.

Wells were installed in the Highland Recreation Area outside the eastern and southern fence line of HiMill Manufacturing to determine if heavy metals were leaching from the HiMill lagoon into the adjacent marsh. Elevated levels of aluminum, copper, chromium and zinc were detected to the east and south-east of the lagoon. Somewhat less elevated levels of these metals were detected to the north-east of the lagoon, near the edge of the HiMill parking lot. Each of these wells was in or adjacent to the marsh and in the direction of groundwater flow from the HiMill property to the marsh.

Procedure

A preliminary site inspection was made on July 9, 1980 at the HiMill Manufacturing Company on M-59 in Highland, Michigan, which produces fabricated tubing and fittings (Legrand assessment, July 29, 1980). The inspection included some hand augering to determine the types of sediment on the site.

The wells were installed on May 18, 1981. The boreholes were hand-augered and the wells were installed to a maximum depth ranging from 3.84 to 6.9 feet. The wells were constructed of 1-1/4 inch I.D. schedule 80 PVC casing with 3 foot long size 7 slot PVC screens. The well annuli were packed to above the screen with #3 silica sand from the Gibralter Corporation. Bentonite pellets or powdered bentonite was used to complete the filling to the ground surface (see appendix).

The wells were sampled on May 19, 1981, using a hand-operated diaphram pump. The wells were pumped dry, rinsed with a small amount of Lansing city water and pumped dry again to help clear them. They were then allowed to re-fill before being sampled. Lansing city water was also pumped through the pump and hose to rinse them between the pumping of individual wells. Samples were taken for totals of chromium, copper, nickel, lead, zinc, and aluminum and were preserved and cooled according to MDNR Environmental Laboratory procedures. Water levels were measured by chalked tape on June 23, 1981 (see Table 1) and the site was mapped by the MDNR Engineering Division.

Geology and Ground Water Flow

The project site consists of relatively pure, dense clays and thin layers of sandy or gravelly clays. These generally are the result of water deposition and indicate a low permeability clay. This low permeability was observed during sampling by the slowness with which water entered the wells.

The top of the water table is at the ground surface in the vicinity of well HM3, approximately 35 feet east of the lagoon, at an elevation of 1006.0 feet. Ground water flow on the site is east, southeast, and south from the HiMill property into the adjacent marsh (see Table 1 and Figure 1).

Sampling Results

The location of well HM6 southwest of the lagoon was chosen for use as a background well since according to water table measurements it appeared to be out of the influence of drainage from the lagoon. Sampling results confirmed this since the metals concentrations of the water in HM6 were substantially lower than the highest metals concentrations and less than or equal to the lowest metals concentrations of water in the other wells (see Table 2).

The total chromium concentrations of the water in the wells varied from less than 50 ug/l to 160 ug/l (see Table 2 and Figure 2). The two wells with the highest chromium concentrations, HM3 with 160 ug/l and HM4 with 130 ug/l, lie to the east of the HiMill lagoon. The third highest, well HM1 east of the edge of the parking lot, had a chromium concentration of 110 ug/l.

The aluminum concentrations of the well water samples ranged from 1800 ug/l to 7900 ug/l (see Table 2 and Figure 3). Well HM5 southeast of the lagoon had the highest aluminum concentration; 7900 ug/l. The two wells with the next highest aluminum concentrations were HM1, east of the edge of the parking lot, with a concentration of 4600 ug/l, and HM3, east of the lagoon, with a concentration of 4000 ug/l.

The copper concentrations of the water in the wells varied from 30 ug/l to 840 ug/l (see Table 2 and Figure 4). The well with the highest copper concentration, 840 ug/l, was HM4 southeast of the lagoon. The two next highest copper concentrations were 480 ug/l in HM3 east of the lagoon, and 230 ug/l in HM1 east of the edge of the parking lot.

The zinc concentration of the well water samples ranged from less than 50 ug/l to 240 ug/l (see Table 2 and Figure 5). Well HM3 east of the lagoon with 240 ug/l was the well with the highest zinc concentration. The next highest zinc concentration was 110 ug/l in HM1 east of the edge of the parking lot.

Conclusions

The aluminum concentration was approximately 4.4 times higher in well HM5 and approximately 2.6 times higher in well HM1 than in background well HM6. The zinc concentration was approximately 4.8 times higher in well HM3 and at least 2.2 times higher in well HM1 than in background well HM6. The total chrome concentration was 3.2 times higher in well HM3, less than 2.6 times higher in HM4, and more than 2.2 times higher in HM1 than in well HM6. The copper concentration was 28 times higher in HM4, 16 times higher in HM3, and approximately 7.7 times higher in HM1 than in the background well HM6.

This information combined with measurements of the top of the water table (see Figure 1) indicate that copper, aluminum, chromium, and zinc are leaving the HiMill plant site in the ground water and are flowing into the adjacent Highland Recreation area. Most of the metals are migrating east and east-southeast from the lagoon area and were detected by wells HM3 and HM4. Some of the metals are migrating from the northeast end of the plant site and were detected by well HM1 near the edge of the parking lot. Aluminum and small amounts of chromium, copper, and zinc are migrating southeast from the lagoon area and were detected by well HM5.

Project Personnel

Geologist:	Kathleen Sibo
Driller:	Charles Ingalls
Driller's Assistant:	Jerry Parish
Supervisor:	Elmore Eltzroth
Surveyor:	Gary Bilow, MDNR Engineering Division
Analysis:	MDNR Environmental Laboratory
Drafting:	Gary Taylor, MDNR Engineering Division

Table 1 Well Elevations and Water Elevations in Feet; HiMill Inc. Vicinity
June 23, 1981

Well	Elevation Top of Casing	Elevation Ground	Height of Casing	Depth to Water	Elevation Water
HM1	1007.53	1006.5	1.03	1.62	1005.91
HM2	1007.07	1006.0	1.07	1.75	1005.32
HM3	1010.16	1006.0	4.16	4.7	1006.0
HM4	1009.58	1006.2	3.38	4.21	1005.37
HM5	1010.40	1006.4	4.0	4.64	1005.76
HM6	1011.09	1009.9	1.19	3.35	1007.74

Elevations are based on MDOT Bench Mark 156A.

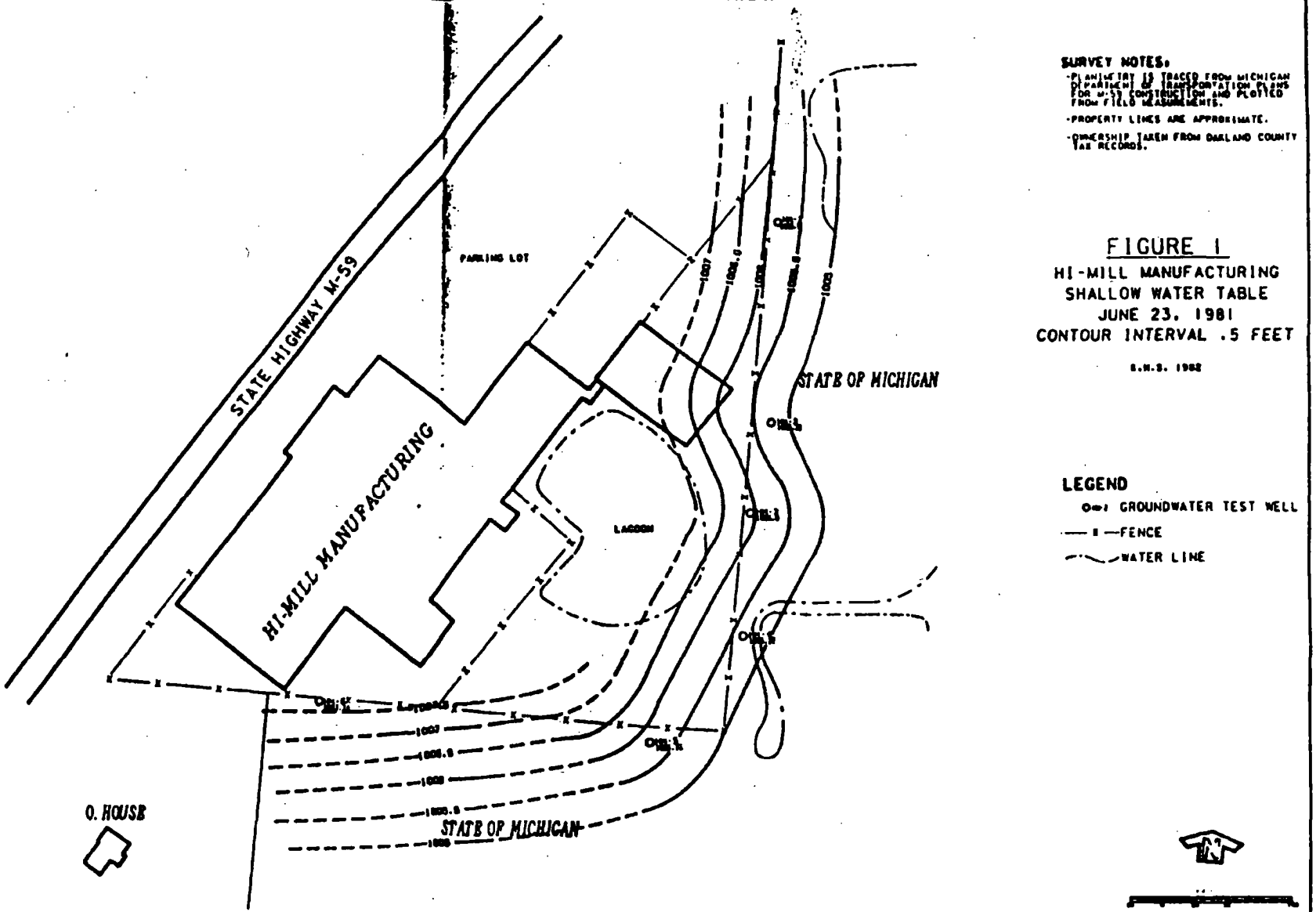
KHS 1982

Table 2 Metals Content of Water Samples, HiMill Vicinity - May 19, 1981

Well	Depth (feet)	Total Cadmium (ug/l)	Total Chromium (ug/l)	Total Copper (ug/l)	Total Nickel (ug/l)	Total Lead (ug/l)	Total Zinc (ug/l)	Total Aluminum (ug/l)
HM1	6.9	K 20	110	230	K 50	K 50	110	4600
HM2	6.9	K 20	80	30	K 50	K 50	60	2500
HM3	3.84	K 20	160	480	K 50	K 50	240	4000
HM4	4.62	K 20	130	840	K 50	K 50	K 50	3000
HM5	4	K 20	K 50	90	K 50	K 50	70	7900
HM6	6.81	K 20	K 50	30	K 50	K 50	K 50	1800

Note: Depth is measured from ground level to the bottom of a three foot screen.
K = Actual value is less than value given.

KHS 1982



SURVEY NOTES:

- PLANIMETRY IS TRACED FROM MICHIGAN DEPARTMENT OF TRANSPORTATION PLANS FOR M-59 CONSTRUCTION AND PLOTTED FROM FIELD MEASUREMENTS.
- PROPERTY LINES ARE APPROXIMATE.
- OWNERSHIP TAKEN FROM OAKLAND COUNTY TAX RECORDS.

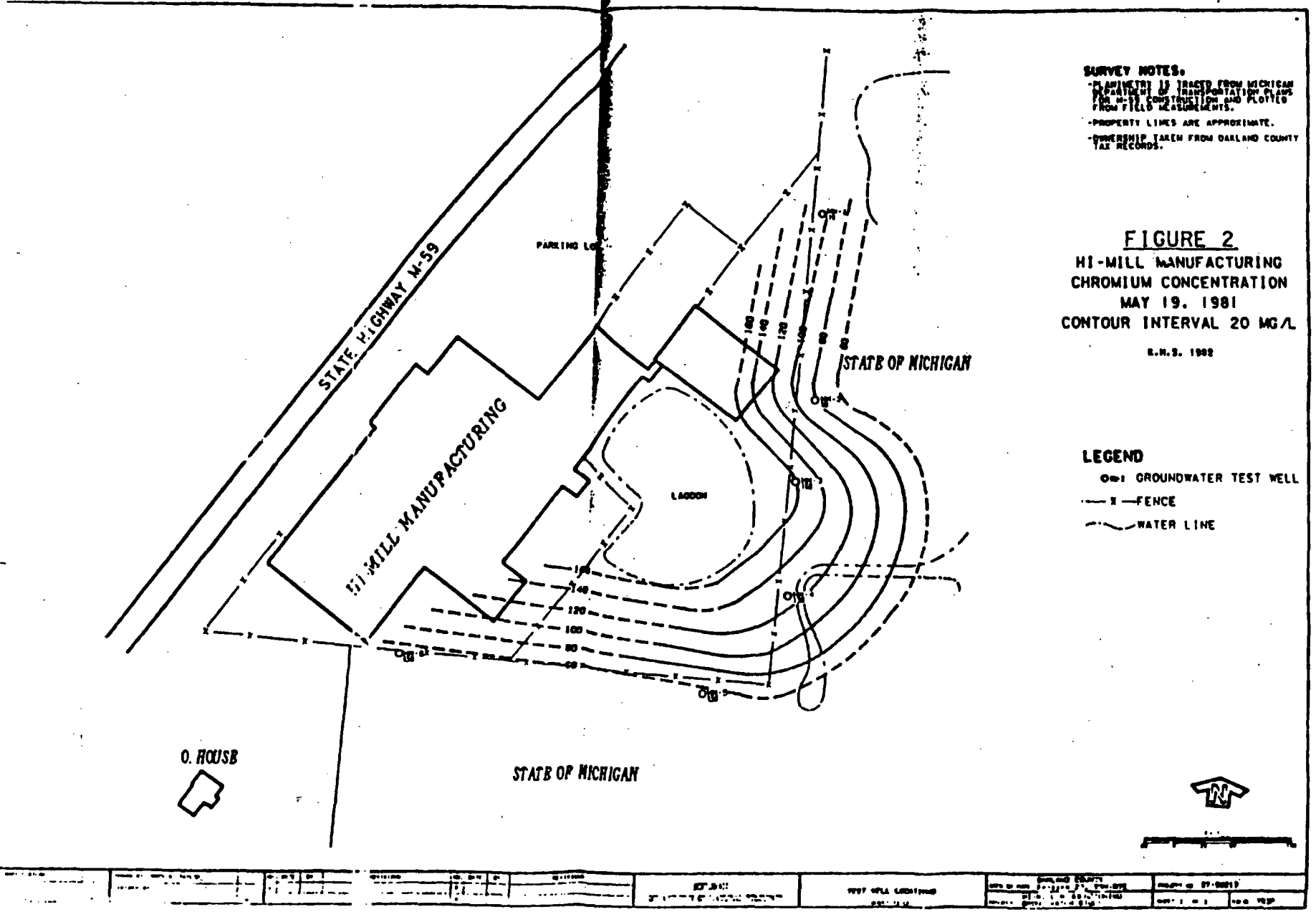
FIGURE 1

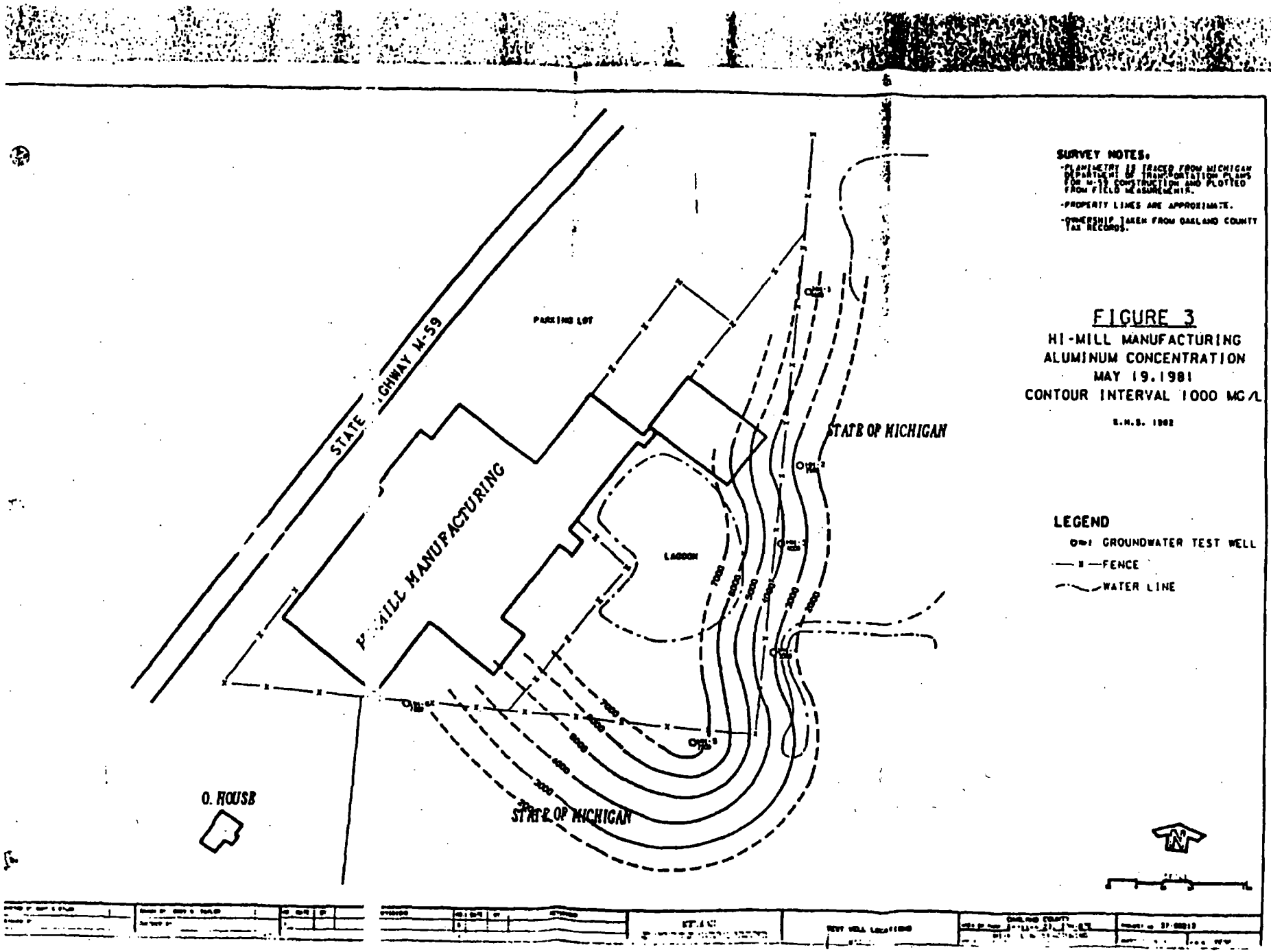
HI-MILL MANUFACTURING
SHALLOW WATER TABLE
JUNE 23, 1981
CONTOUR INTERVAL .5 FEET

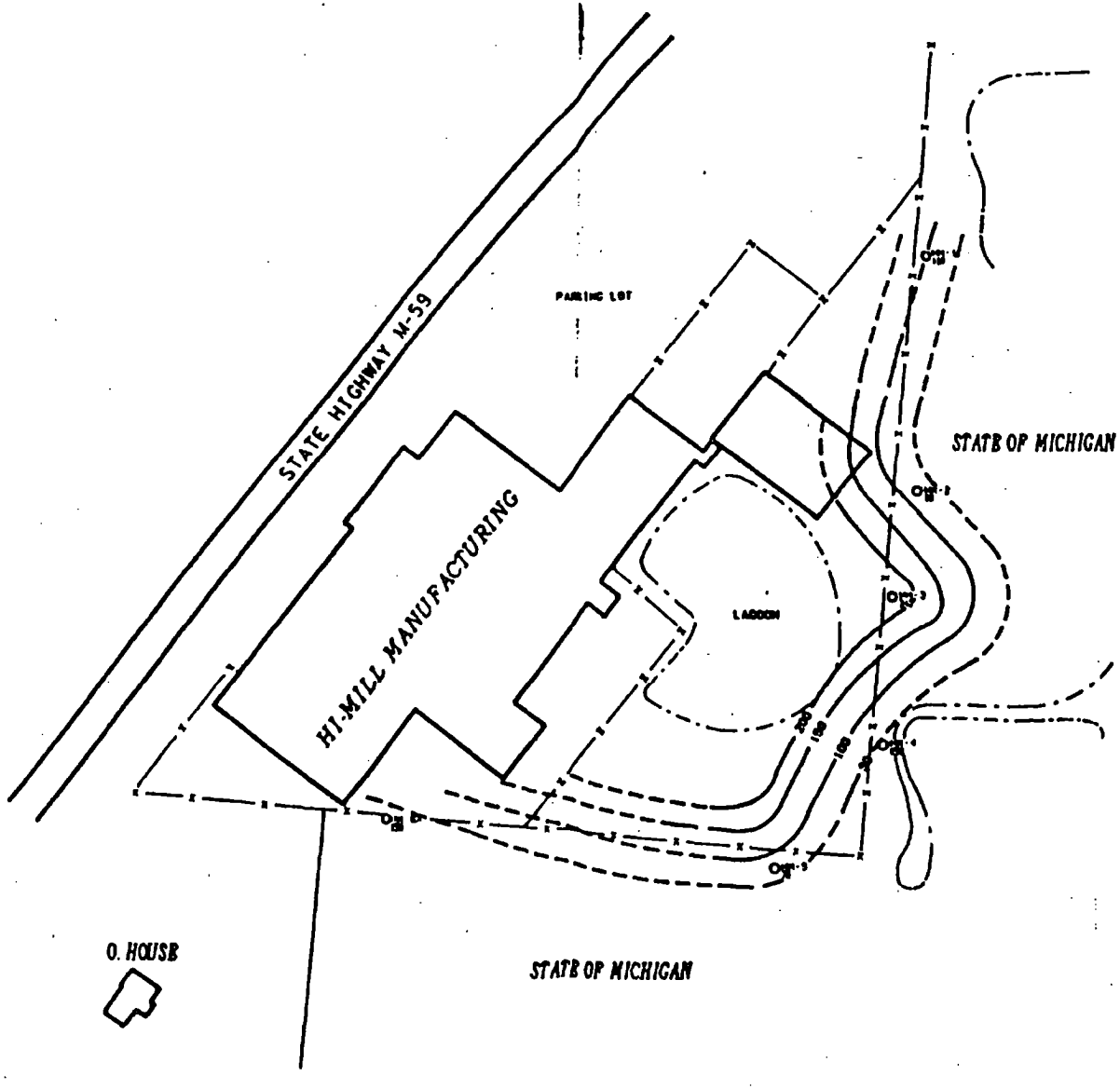
S.H.S. 1982

LEGEND

- GROUNDWATER TEST WELL
- —x—FENCE
- WATER LINE


STATE HIGHWAY M-59
PARKING LOT
HI-MILL MANUFACTURING
LAGOON
STATE OF MICHIGAN
STATE OF MICHIGAN
O. HOUSE
SURVEY NOTES.
-PLANIMETRY IS TRACED FROM MICHIGAN DEPARTMENT OF TRANSPORTATION PLANS FOR M-59 CONSTRUCTION AND PLOTTED FROM FIELD MEASUREMENTS.
-PROPERTY LINES ARE APPROXIMATE.
-OWNERSHIP TAKEN FROM OAKLAND COUNTY TAX RECORDS.
FIGURE 2
HI-MILL MANUFACTURING
CHROMIUM CONCENTRATION
MAY 19, 1981
CONTOUR INTERVAL 20 MG/L
LEGEND
GROUNDWATER TEST WELL
FENCE
WATER LINE


SURVEY NOTES:
-PLANIMETRY AS TRACED FROM MICHIGAN DEPARTMENT OF TRANSPORTATION PLANS FOR M-59 CONSTRUCTION AND PLOTTED FROM FIELD MEASUREMENTS.
-PROPERTY LINES ARE APPROXIMATE.
-OWNERSHIP TAKEN FROM OAKLAND COUNTY TAX RECORDS.
FIGURE 3
HI-MILL MANUFACTURING
ALUMINUM CONCENTRATION
MAY 19,1981
CONTOUR INTERVAL 1000 MG/L
LEGEND
GROUNDWATER TEST WELL
FENCE
WATER LINE
STATE HIGHWAY M-59
PARKING LOT
HI-MILL MANUFACTURING
LAGOON
STATE OF MICHIGAN
STATE OF MICHIGAN
O. HOUSE
7000
6000
5000
4000
3000
2000
1000



SURVEY NOTES:

- PLANIMETRY IS TRACED FROM MICHIGAN DEPARTMENT OF TRANSPORTATION PLANS FOR M-59 CONSTRUCTION AND PLOTTED FROM FIELD MEASUREMENTS.
- PROPERTY LINES ARE APPROXIMATE.
- OWNERSHIP TAKEN FROM OAKLAND COUNTY TAX RECORDS.

FIGURE 5

HI-MILL MANUFACTURING
ZINC CONCENTRATION
MAY 19, 1981
CONTOUR INTERVAL 50 MG/L

R.M.S. 1982

LEGEND

- GROUNDWATER TEST WELL
- —x—FENCE
- WATER LINE

SCALE

Appendix

ENVIRONMENTAL SERVICES DIVISION
GROUNDWATER INVESTIGATION UNIT

TEST WELL RECORD

WELL NO. HM 1

PROJECT: Hi-Mill Vicinity

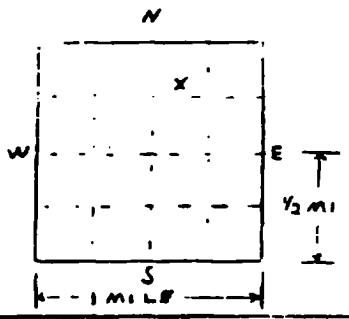
PERMIT NO. 791-812-463

LOCATION

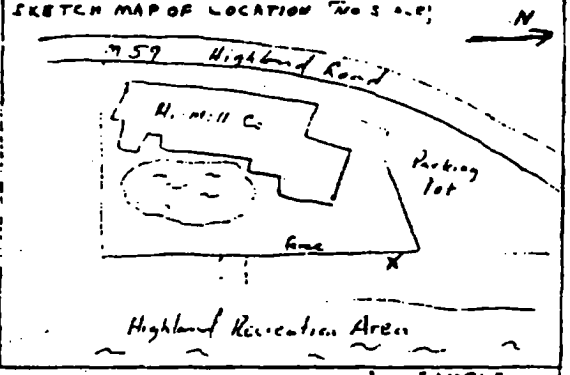
COUNTY: Oakland | TOWNSHIP NAME: Highland | FRACTION: SE ¼ NW ¼ NE ¼ | SECTION NO.: 23 | TOWN: T 3 N N/S | RANGE: R 7 E E/

STREET ADDRESS AND CITY OF WELL LOCATION: Highland Road (M59), Highland, MI.

LOCATION IN SECTION (MARK WITH "X")



SKETCH MAP OF LOCATION (Not to scale)



PROPERTY OWNER: State of Michigan
ADDRESS: Highland State Recreation Area, Highland Road, Highland, MI. 48031

WELL DEPTH (COMPLETED): 6.9 ft.
DATE OF COMPLETION: 5/18/81
DRILLING METHOD(S): 3" hand auger
DEPTH(S): 7 feet

CASING: DIAMETER 1¼" IN. TO 3.9 FT. DEPTH | WEIGHT ABOVE SURFACE 1.03 FT
_____ IN. TO _____ FT. DEPTH TYPE PVC WEIGHT Sch. 20

SCREEN: TYPE PVC DIAM. 1¼"
SLOT/GAUGE 7 slot LENGTH 3 ft.
SET BETWEEN 3.9 FT. AND 6.9 FT.

WATER LEVELS: FIRST NOTED AT 3-4 FT BELOW SURFACE
AFTER COMPLETION 1.62 FT BELOW SURFACE ☐ OR CASING TOP ☒

SURFACE ELEVATION: 1006.5 ft.

SEALING METHOD: Sand packed to 2' surface, filled to surface with powdered bentonite.

CREW: Driller Charles Ingalls
Driller's Assistant Jerry Parrish
Geologist Kathleen Sibo
RECORD BY Kathleen Sibo

DATE 6/26/81
REMARKS

DEPTH FROM	DEPTH TO	THICKNESS OF STRATUM	DESCRIPTION	SAMPLE IDENTIFICATION NO.	SAMPLE IDENTIFICATION TYPE
0'	7'	7'	Clay, dense + plastic, blue-grey w/ limonite staining.		

PLUGGING AND ABANDONMENT METHOD

DATE
CREW
RECORD BY

ENVIRONMENTAL SERVICES UNIT
GROUNDWATER INVESTIGATION UNIT

TEST WELL RECORD

WELL NO. HM 2

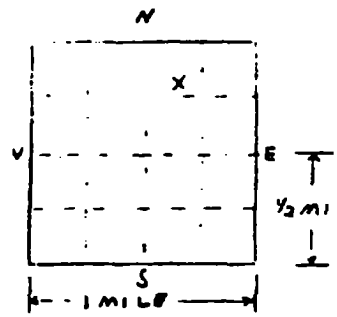
PROJECT: Hi-Mill Vicinity

PERMIT NO. 791-313-463

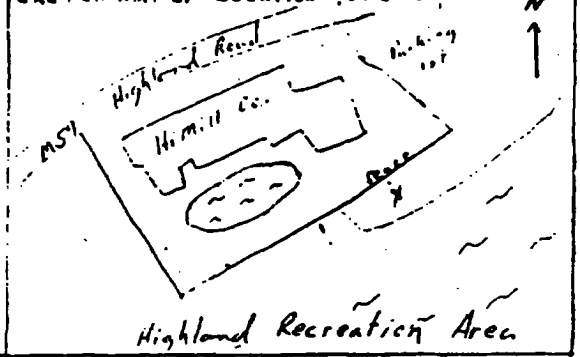
LOCATION
COUNTY: Oakland
TOWNSHIP NAME: Highland
FRACTION: SE ¼ NW ¼ NE ¼
SECTION NO.: 23
TOWN: T3N N/S
RANGE: R7E E/W

STREET ADDRESS AND CITY OF WELL LOCATION
Highland Road (M59), Highland

LOCATION IN SECTION (MARK WITH "X")



SKETCH MAP OF LOCATION (NO SCALE)



PROPERTY OWNER: State of Michigan
ADDRESS: Highland State Recreation Area, Highland Road, Highland, MI. 48031

WELL DEPTH (COMPLETED): 6.9 ft
DATE OF COMPLETION: 5/15/81

DRILLING METHOD(S): 3" hand auger
DEPTH(S): 7 feet

CASING: DIAMETER: 1¼ IN. TO 3.9 FT. DEPTH
HEIGHT ABOVE SURFACE: 1.27 FT
____ IN. TO ____ FT. DEPTH
TYPE: PVC
WEIGHT: Sch 40

SCREEN: TYPE: PVC
DIAM.: 1¼"
SLOT/GAUGE: 7 slot
LENGTH: 3 ft.
SET BETWEEN 3.9 FT. AND 6.9 FT.

WATER LEVEL:
FIRST NOTED AT ____ FT BELOW SURFACE
AFTER COMPLETION 1.25 FT BELOW SURFACE ☐ OR CASING TOP ☒

SURFACE ELEVATION: 1006 ft.

SEALING METHOD: Sand packed to 2'3" of top, powdered bentonite to the surface

CREW: Driller Charles Ingalls
Driller's Assistant Jerry Parrish
Geolog. ST Kathleen Sibo

RECORD BY: Kathleen Sibo

DATE: 6/26/81

REMARKS

DEPTH FROM	DEPTH TO	THICKNESS OF STRATUM	DESCRIPTION	SAMPLE IDENTIFICATION NO.	SAMPLE IDENTIFICATION TYPE
1'	7'	7'	Clay, grey		

PLUGGING AND ABANDONMENT METHOD

DATE
CREW
RECORD BY

GROUNDWATER INVESTIGATION UNIT

TEST WELL RECORD

WELL NO. HM3

PROJECT: Hi-Mill Laundry

PERMIT NO. 791-512-163

LOCATION

COUNTY: Oakland

TOWNSHIP NAME: Highland

FRACTION: SW ¼ NW ¼ NE ¼

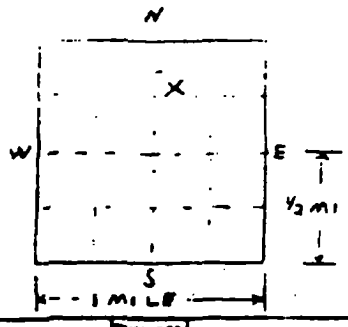
SECTION NO.: 23

TOWN: T3N N/S

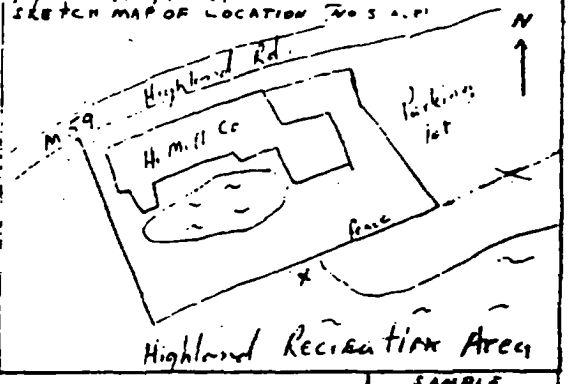
RANGE: R7E E/W

STREET ADDRESS AND CITY OF WELL LOCATION: Highland Road (M59) Highland

LOCATION IN SECTION (MARK WITH "X")



SKETCH MAP OF LOCATION (NO SCALE)



PROPERTY OWNER: State of Michigan

ADDRESS: Highland State Recreation Area, Highland Road, Highland, MI. 48031

WELL DEPTH (COMPLETED): 3.84 ft.

DATE OF COMPLETION: 5/18/81

DRILLING METHOD(S): 3" hand auger

DEPTH(S): 4 feet

CASING: DIAMETER 1¼ IN. TO .84 FT. DEPTH; WEIGHT ABOVE SURFACE 4.16 FT

_____ IN. TO _____ FT. DEPTH TYPE PVC WEIGHT Sch. 80

SCREEN: TYPE PVC DIAM. 1¼"

SLOT/GAUGE 7 slot LENGTH 3 ft.

SET BETWEEN .84 FT. AND 3.84 FT.

WATER LEVELS: FIRST NOTED AT 4.1 FT BELOW SURFACE

AFTER COMPLETION 4.7 FT BELOW SURFACE OR CASING TOP

SURFACE ELEVATION: 1006 ft.

SEALING METHOD: Sand packed to w. 2 in. of surface, then filled to surface with powdered bentonite, + bentonite pell

CREW: Driller Charles Ingalls

Drillers Assistant Jerry Parrish

Geologist Kathleen Sibo

RECORD BY: Kathleen Sibo Kathleen L

DATE: 6/26/81

REMARKS

DEPTH FROM	DEPTH TO	THICKNESS OF STRATUM	DESCRIPTION	SAMPLE IDENTIFICATION NO	SAMPLE IDENTIFICATION TYPE
0'	3'	3'	Clay		
3'	3'6"	6"	Clay, gravelly, sandy		
3'6"	4'	6"	Clay		

PLUGGING AND ABANDONMENT METHOD

DATE

CREW

RECORD BY

DEPARTMENT OF NATURAL RESOURCES
GROUNDWATER QUALITY DIVISION

TEST WELL RECORD

E... NO. HM4

PROJECT: HiMill Vicinity

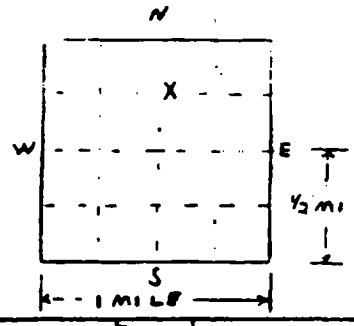
PERMIT NO. 791-X12-463

LOCATION

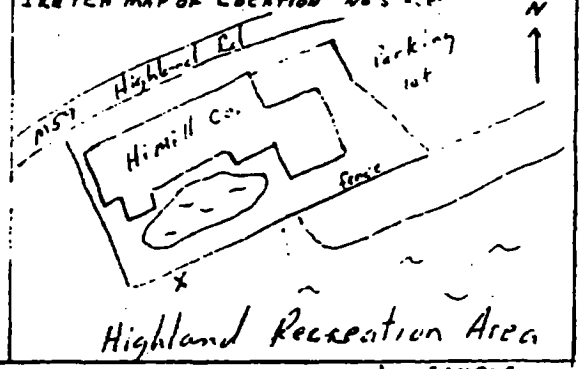
COUNTY: Oakland | TOWNSHIP NAME: Highland | FRACTION: SW ¼ NW ¼ NE ¼ | SECTION NO.: 23 | TOWN: T3N N/S | RANGE: R7E E

STREET ADDRESS AND CITY OF WELL LOCATION: Highland Road (M59) Highland

LOCATION IN SECTION (MARK WITH "X")



SKETCH MAP OF LOCATION (NOT TO SCALE)



PRESENT OWNER: State of Michigan

ADDRESS: Highland State Recreation A. Highland Road, Highland, MI

WELL DEPTH (COMPLETED): 4.62 ft. | DATE OF COMPLETION: 5/18/81

DRILLING METHOD(S): 3" hand auger | DEPTH(S): 5 feet

CASING: DIAMETER 1¼ IN. TO 1.62 FT. DEPTH | HEIGHT ABOVE SURFACE 3.32 FT

____ IN. TO ____ FT. DEPTH | TYPE PVC | WEIGHT SCH 2

SCREEN: TYPE PVC | DIAM. 1¼"

SLOT/GAUZE 7 slot | LENGTH 3 ft.

SET BETWEEN 1.62 FT. AND 4.62 FT.

WATER LEVEL: FIRST NOTED AT 1 FT BELOW SURFACE

AFTER COMPLETION 4.21 FT BELOW SURFACE ☐ OR CASING TOP ☒

SURFACE ELEVATION: 1006.2

SEALING METHOD: Sand packed to w/ 2-3 in. of surface, then bentonite pellets to surface.

CREW: Driller Charles Ingalls
Driller's Assistant Jerry Parrish
Geologist Kathleen Sibo

RECORD BY: Kathleen S. Sibo Kathleen Sibo

DATE: 6/26/81

REMARKS:

DEPTH FROM	DEPTH TO	THICKNESS OF STRATUM	DESCRIPTION	SAMPLE IDENTIFICATION NO.	SAMPLE IDENTIFICATION TYPE
0'	2'	2'	clay		
2'	4'	2'	Muck, dark, with sand and some clay and gravel.		
4'	5'	1'	clay		

PLUGGING AND ABANDONMENT METHOD

DATE
CREW
RECORD BY

DIVISION OF ENVIRONMENTAL SERVICES
GROUNDWATER INVESTIGATION UNIT

TEST WELL RECORD

WELL NO. HM15

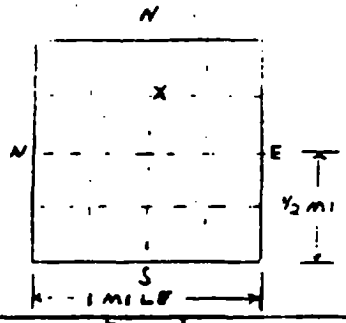
PROJECT: Hi Mill Vicinity

PERMIT NO. 791-912-463

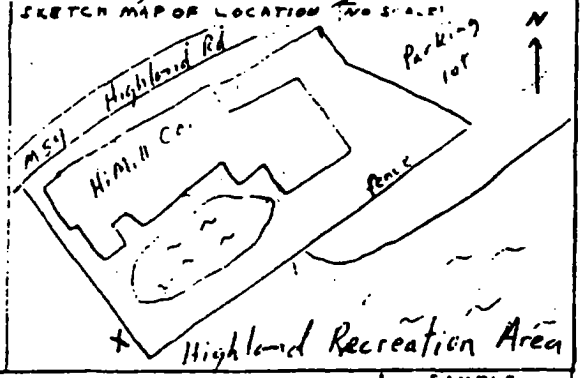
LOCATION
COUNTY: Oakland
TOWNSHIP NAME: Highland
FRACTION: SW ¼ NW ¼ NE ¼
SECTION NO.: 23
TOWN: T3N N/S
RANGE: R7E E/I

STREET ADDRESS AND CITY OF WELL LOCATION
Highland Road (M59) Highland

LOCATION IN SECTION (MARK WITH "X")



SKETCH MAP OF LOCATION (NO SCALE)



PROPERTY OWNER: State of Michigan
ADDRESS: Highland State Recreation Area, Highland Road, Highland, MI, 48031

WELL DEPTH (COMPLETED): 4 ft.
DATE OF COMPLETION: 5/18/81
DRILLING METHOD(S): 3" hand auger
DEPTH(S): 4 ft.

CASING: DIAMETER 1¼ IN. TO 1 FT. DEPTH; HEIGHT ABOVE SURFACE 4 FT
____ IN. TO ____ FT. DEPTH; TYPE PVC, WEIGHT SC. 80

SCREEN: TYPE PVC; DIAM. 1¼"
SLOT/GAUGE 7 slot; LENGTH 3 ft.
SET BETWEEN 1 FT. AND 4 FT.

WATER LEVELS:
FIRST NOTED AT ____ FT BELOW SURFACE
AFTER COMPLETION 4.64 FT BELOW SURFACE OR CASING TOP

SURFACE ELEVATION: 1006.4

SEALING METHOD: Sand pack to within a few inches of surface, bentonite pell. and powdered bentonite to surface.

CREW: Driller Charles Ingalls
Driller's Assistant Jerry Parrish
Geologist Kathleen Sibo

RECORD BY: Kathleen Sibo

DATE: 6/26/81

REMARKS

DEPTH FROM	DEPTH TO	THICKNESS OF STRATUM	DESCRIPTION	SAMPLE IDENTIFICATION NO	SAMPLE IDENTIFICATION TYPE
0'	2"	2"	Topsoil		
	4'	3'10"	Clay, dense grey-brown		

PLUGGING AND ABANDONMENT METHOD

DATE
CREW
RECORD BY

ENVIRONMENTAL SERVICES DIVISION
GROUNDWATER INVESTIGATION UNIT

TEST WELL RECORD

...16

PROJECT: Hi Mill Vicinity

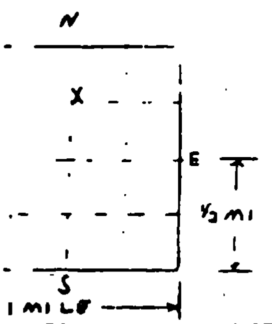
PERMIT NO. 791-812-463

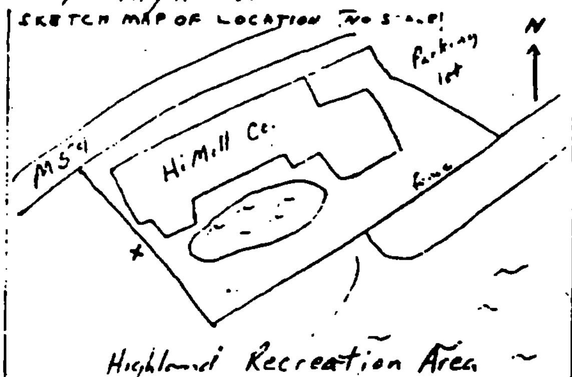
COUNTY	TOWNSHIP NAME	FRACTION	SECTION NO.	TOWN	RANGE
...k'and	Highland	SW ¼ NW ¼ NE ¼	23	T3N N/S	R7E E/W

ADDRESS AND CITY OF WELL LOCATION
...and Road (M 59) Highland

...W IN SECTION WITH "X"

SKETCH MAP OF LOCATION (NO SCALE)





PROPERTY OWNER State of Michigan
ADDRESS Highland State Recreation Area
Highland Road
Highland, MI. 48031

WELL DEPTH (COMPLETED) 6.81 ft.
DATE OF COMPLETION 5/19/81

DRILLING METHOD(S) 3" hand auger
DEPTH(S) 7 ft.

CASING: DIAMETER 1¼ IN. TO 3.81 FT. DEPTH
HEIGHT ABOVE SURFACE 1.19 FT
_____ IN. TO _____ FT. DEPTH
TYPE PVC
WEIGHT [illegible]

SCREEN: TYPE PVC
DIAM. 1¼"
SLOT/GAUZE 7 slot
LENGTH 3 ft.
SET BETWEEN 3.81 FT. AND 6.81 FT.

WATER LEVELS
FIRST NOTED AT _____ FT BELOW SURFACE
AFTER COMPLETION 3.35 FT BELOW SURFACE ☐ OR CASING TOP ☒

SURFACE ELEVATION 1009.9

SEALING METHOD Sand packed to within few inches of top, filled to surface with bentonite pellets.

CREW Driller Charles Ingalls
Driller's Assistant Jerry Parrish
Geologist Kathleen Sibe

RECORDED BY Kathleen Sibe *Kathleen Sibe*

DATE 6/26/81

REMARKS

THICKNESS OF STRATUM	DESCRIPTION	SAMPLE IDENTIFICATION NO	TYPE
1'3"	Clay, sandy + gravelly. May include some fill dirt.		
5'9"	Clay, yellow w/ some sand and gravel.		

PLUGGING AND ABANDONMENT METHOD

DATE
CREW

APPENDIX D

REPRESENTATIVE LOCAL WELL LOGS

JAN 14 1976

WATER WELL RECORD
ACT 294 PA 1965

MICHIGAN DEPARTMENT OF PUBLIC HEALTH

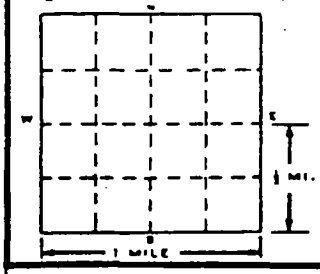
1 LOCATION OF WELL

County	Township Name	Fraction	Section Number	Town Number	Range Number
Oakland	Highland	NE SE NE	2	3 N/S.	7 E/W.

Distance And Direction from Road Intersections: SE

Street address & City of Well Location:

Locate with "X" in section below — Sketch Map:



3 OWNER OF WELL

Address: d

4 WELL DEPTH: (completed) 240 ft. **Date of Completion** 8-11-75

5 ☒ Cable tool ☐ Rotary ☐ Driven ☐ Dug ☐ Hollow rod ☐ Jetted ☐ Bored ☐ ____

6 USE: ☒ Domestic ☐ Public Supply ☐ Industry ☐ Irrigation ☐ Air Conditioning ☐ Commercial ☐ Test Well ☐

7 CASING: Threaded ☐ Welded ☒ Height: Above/Below Surface 1 ft.
Diam. 4 in. to 236 ft. Depth; Weight 10.40 lbs./ft.
____ in. to ____ ft. Depth; Drive Shoe? Yes ☒ No ☐

2 FORMATION	THICKNESS OF STRATUM	DEPTH TO BOTTOM OF STRATUM
Set pipe in clay - drove	30	30
Clay	43	73
Gravel	6	79
Clay	96	175
Gravel	20	195
Clay & Gravel	45	230
Water gravel	10	240

8 SCREEN: Type: Slotted Dia.: 3½"
Slot/Gauze 12 Length 4 ft.
Set between 236 ft. and 240 ft.
Fittings:

9 STATIC WATER LEVEL 53 ft. below land surface

10 PUMPING LEVEL below land surface
____ ft. after ___ hrs. pumping ____ g.p.m.
____ ft. after ___ hrs. pumping ____ g.p.m.

11 WATER QUALITY in Parts Per Million:
Iron (Fe) ____ Chlorides (Cl) ____
Hardness ____ Other ____

12 WELL HEAD COMPLETION: ☐ In Approved Pit ☒ Pitless Adapter ☐ 12" Above Grade

13 Well Grouted? ☐ Yes ☒ No
☐ Neat Cement ☐ Bentonite ☐ ____
Depth: From ____ ft. to ____ ft.

14 Nearest Source of possible contamination
50 feet ____ Direction Septic tank Type
Well disinfected upon completion ☒ Yes ☐ No

15 PUMP: ☐ Not installed
Manufacturer's Name ____
Model Number ____ HP ___ Volts ____
Length of Drop Pipe ____ ft. capacity ___ G.P.M.
Type: ☐ Submersible ☐ Jet ☐ Reciprocating

OAKLAND COUNTY DEPT. OF HEALTH JAN 13 1976 E.H.N.O.

USE A 2ND SHEET IF NEEDED

16 Remarks, elevation, source of data, etc.

ADDED INFO BY DRILLER, ITEM NO. D3
*CORRECTED BY
**ADDITION BY
ELEVATION
DEPTH TO ROCK

17 WATER WELL CONTRACTOR'S CERTIFICATION:
This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

Fettig Well Drilling — REGISTERED BUSINESS NAME — 0413 REGISTRATION NO.

Address 1051 Round Lake Road

Signed ____ AUTHORIZED REPRESENTATIVE Date 1-6-76

D67d 100M (Rev. 12-68)

GEOLOGICAL SURVEY COPY

WATER WELL AND PUMP RECORD

PART 127 ACT 368 P A 1978

PERMIT NUMBER

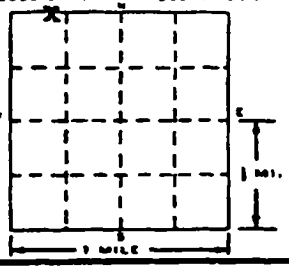
1 LOCATION OF WELL

County	Township Name	Fraction	Section Number	Town Number	Range Number
Oakland	Highland	NE ¼ NW ¼ NW ¼	24	3 (N/S)	7 (E/W)

Distance And Direction From Road Intersection

Street Address & City of Well Location

Locate with "X" in Section Below — Sketch Map



3 OWNER OF WELL

Address

Address Same As Well Location? ☒ Yes ☐ No

4 WELL DEPTH (completed) 123 ft. — **Date of Completion** 2/10/83

5 ☒ Cable tool ☐ Rotary ☐ Driven ☐ Dug ☐ Hollow rod ☐ Auger ☐ Jetted ☐ _____

6 USE ☒ Domestic ☐ Type I Public ☐ Type III Public ☐ Irrigation ☐ Type IIa Public ☐ Heat pump ☐ Test Well ☐ Type IIb Public ☐ _____

7 CASING Diameter ☒ Steel ☐ Threaded ☐ Plastic ☒ Welded

4 in. to 119 ft. depth

_____ in. to _____ ft. depth

Grouted Drill Hole Diameter

_____ in. to _____ ft. depth

_____ in. to _____ ft. depth

Height: Above/Below Surface 1 ft

Weight 11 lbs /ft.

Drive Shoe ☒ Yes ☐ No

2 FORMATION DESCRIPTION	THICKNESS OF STRATUM	DEPTH TO BOTTOM OF STRATUM
Sand & Coarse Gravel (Red)	25	25
Clay, Sand & Coarse Gravel (Red)	15	40
Sand & Gravel (Red)(Aquifer)	15	55
Sand & Gravel (Gray)(Aquifer)	15	70
Silt & Clay (Gray)	3	73
Sand (Gray) (Aquifer)(Muddy)	7	80
Fine Sand (Gray) (aquifer)	10	90
Silt & Clay (Gray)	12	102
Fine Sand (Gray) (Aquifer)	4	106
Silt & Clay	10	116
Fine Sand (Gray)(Aquifer)	2	118
Fine Sand & Coarse Gravel (Aquifer)	5	123

RECEIVED Dept. of Public Health FEB 25 1983 Bureau of Environmental Health Occupational Health

USE A 2ND SHEET IF NEEDED

8 SCREEN ☐ Not Installed

Type Stainless Diameter 3"

Slot size 10 Length 4'

Set between 119 ft and 123 ft.

FITTINGS ☒ K-Packer ☐ Lead Packer ☐ Bremer Check

☒ Blank above screen 1 ft. Other _____

9 STATIC WATER LEVEL

28 ft below land surface ☐ Flow

10 PUMPING LEVEL below land surface

28 ft. after 1 hrs pumping at 60 G.P.M.

_____ ft. after _____ hrs pumping at _____ G.P.M.

11 WELL HEAD COMPLETION ☒ Pitless adapter ☐ 12" above grade ☐ Basement offset ☐ Approved pit

12 WELL GROUTED? ☒ No ☐ Yes From _____ to _____ ft

☐ Neat cement ☐ Bentonite ☐ Other _____

No of bags of cement _____ Additives _____

13 Nearest source of possible contamination

Type Sewer Distance 75 ft. Direction N

Well disinfected upon completion? ☒ Yes ☐ No

14 PUMP ☐ Not Installed ☐ Pump Installation Only

Manufacturer's name _____

Model number _____ HP _____ Volts _____

Length of Drop Pipe _____ ft. capacity _____ G.P.M.

TYPE ☐ Submersible ☐ Jet _____

PRESSURE TANK

Manufacturer's name _____

Model number _____ Capacity _____ Gallons

15 Remarks, elevation, source of data, etc.

Driller: Frank M. Benton

16 WATER WELL CONTRACTOR'S CERTIFICATION:

This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

Bob LaLone Well Drilling — 63-0633

REGISTERED BUSINESS NAME — REGISTRATION NO.

Address 10075 Davisburg Rd., Davisburg, Mi

Signed Robert J. LaLone Date 10-24-83

AUTHORIZED REPRESENTATIVE

D67d (Rev 10-80)

MAR 28 1975

WATER WELL RECORD

ACT 294 SE/NE/SW

MICHIGAN DEPARTMENT OF PUBLIC HEALTH

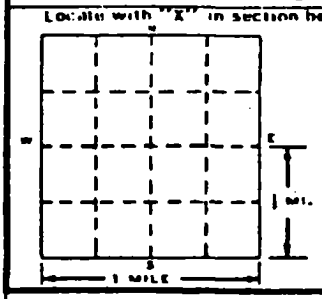
1 LOCATION OF WELL

County	Township Name	Fraction	Section Number	Town Number	Range Number
Oakland	Highland	~~SW¼ SW¼ SE¼~~	23	3 N/S.	7 E/W.

Distance And Direction From Nearest Intersections

Street address & City of Well Location

Locate with "X" in section below — Sketch Map:



3 OWNER OF WELL:

Address

4 WELL DEPTH: (completed) Date of Completion: 162 ft. 8-23-73

5 ☒ Cable tool ☐ Rotary ☐ Driven ☐ Dug ☒ Hollow rod ☐ Jetted ☐ Bored ☐ ____

6 USE: ☒ Domestic ☐ Public Supply ☐ Industry ☐ Irrigation ☐ Air Conditioning ☐ Commercial ☐ Test Well ☐ ____

7 CASING: Threaded ☐ Welded ☒ Height: Above/Below Surface 1 ft.

4 in. to 158 ft. Depth — Weight 10.40 lbs./ft.

____ in. to ____ ft. Depth — Drive Shoe? Yes ☒ No ☐

2 FORMATION	THICKNESS OF STRATUM	DEPTH TO BOTTOM OF STRATUM
Stood pipe in sand - drove	21	21
Water bearing gravel	22	43
Fine sand some gray clay	112	155
Water bearing gravel sand	7	162

8 SCREEN:

Type: Slotted Dia.: 3"

Slot/Gauze 10 Length 4 ft.

Set between 158 ft. and 162 ft.

Fittings:

9 STATIC WATER LEVEL 23 ft. below land surface

10 PUMPING LEVEL below land surface

____ ft. after ____ hrs. pumping ____ G.P.M.

____ ft. after ____ hrs. pumping ____ G.P.M.

11 WATER QUALITY in Parts Per Million:

Iron (Fe) ____ Chlorides (Cl) ____

Hardness ____ Other ____

12 WELL HEAD COMPLETION: ☐ In Approved Pit ☐ Pitless Adapter ☐ 12" Above Grade

13 Well Grouted? ☒ Yes ☐ No

☐ Neat Cement ☐ Bentonite ☐ ____

Depth: From ____ ft. to ____ ft.

14 Nearest Source of possible contamination

75 feet W Direction Septic tank Type

Well disinfected upon completion ☒ Yes ☐ No

15 PUMP: ☐ Not installed

Manufacturer's Name Flint & Walling

Model Number ____ HP 3/4 Volts 220

Length of Drop Pipe 63 ft. capacity 19 G.P.M.

Type: ☒ Submersible ☐ Jet ☐ Reciprocating

OAKLAND COUNTY DEPT. E.H.D.

USE A 2ND SHEET IF NEEDED

16 Remarks, elevation, source of data, etc.

DRILLER, ITEM NO.

BY

BY

17 WATER WELL CONTRACTOR'S CERTIFICATION:

This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

Fettig Well Drilling — REGISTERED BUSINESS NAME — 0413 — REGISTRATION NO.

Address 1051 Round Lake Road

Signed Jerry L Fettig — AUTHORIZED REPRESENTATIVE — Date 3-25-75

D67d 100M (Rev. 12-68)

GEOLOGICAL SURVEY COPY

WATER WELL RECORD

ACT 294 PA 1965

MICHIGAN DEPARTMENT OF PUBLIC HEALTH

1 LOCATION OF WELL

County	Township Name	Fraction	Section Number	Town Number	Range Number
Oakland	Highland	SE SW/SE	2	3 N/S	7 E/W

Distance And Direction from Road Intersections

REFERENCE 6

Street address & City of Well Location SITE NAME Hi-Mill Manu

Locate with "X" in [redacted]

[redacted]

1 MI. — 1 MILE

2 FORMATION

FORMATION	THICKNESS OF STRATUM	DEPTH TO BOTTOM OF STRATUM
Brown dry sand & gravel	58'	58'
Brown gravel & clay	16'	74'
Gray sandy clay, some gravel	77'	151'
Gray coarse water-bearing sand & gravel	04'	155'

3 OWNER OF WELL:

Address

4 WELL DEPTH: (completed) 155 ft. Date of Completion May 3, 1974

5 [x] Cable tool [ ] Rotary [ ] Driven [ ] Dug [ ] Hollow rod [ ] Jetted [ ] Bored [ ] ____

6 USE: [x] Domestic [ ] Public Supply [ ] Industry [ ] Irrigation [ ] Air Conditioning [ ] Commercial [ ] Test Well [ ] ____

7 CASING: Threaded [ ] Welded [x] Diam. 4 in. to 151 ft. Depth; ____ in. to ____ ft. Depth

Height: Above/Below Surface 1 ft. Weight 10.89 lbs./ft. Drive Shoe? Yes [x] No [ ]

8 SCREEN:

Type: Stainless Dia.: 3 5/8"

Slot/Gauze 12 Length 4'

Set between 151 ft. and 155 ft.

Fittings: K-Packer-1' x 3" Nipple-3" Plug

9 STATIC WATER LEVEL 55 ft. below land surface

10 PUMPING LEVEL below land surface

65 ft. after 1 hrs. pumping 12 g.p.m.

____ ft. after ____ hrs. pumping ____ g.p.m.

11 WATER QUALITY in Parts Per Million:

Iron (Fe) ____ Chlorides (Cl) ____

Hardness ____ Other ____

12 WELL HEAD COMPLETION: [ ] In Approved Pit [x] Pitless Adapter [ ] 12" Above Grade

13 Well Grouted? [ ] Yes [x] No

[ ] Neat Cement [ ] Bentonite [ ] ____

Depth: From ____ ft. to ____ ft.

14 Nearest Source of possible contamination 50 feet ____ Direction Septic Type

Well disinfected upon completion [x] Yes [ ] No

15 PUMP: [ ] Not installed

Manufacturer's Name Sta-Rite

Model Number 8P4C2 HP 1/2 Volts 230

Length of Drop Pipe 84 ft. capacity 8 G.P.M.

Type: [x] Submersible [ ] Jet [ ] Reciprocating

OAKLAND COUNTY HEALTH DEPT. OFFICE RECEIVED MAY 29 1974 RECD

USE 2ND SHEET IF NEEDED

16 Remarks, elevation, source of data, etc.

MOOD ... DRILLER'S NO.

DEPTH TO ROCK

17 WATER WELL CONTRACTOR'S CERTIFICATION:

This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

James H. Layman — REGISTERED BUSINESS NAME — 0645 REGISTRATION NO.

Address 10275 Eagle Rd., Davisburg, Mich.

Signed [signature] AUTHORIZED REPRESENTATIVE Date 5/4/74

D67d 100M (Rev. 12-68)

2 JUL 29 1975

WATER WELL RECORD

ACT 294 PA 1965

MICHIGAN DEPARTMENT OF PUBLIC HEALTH

1 LOCATION OF WELL

County	Township Name	Fraction	Section Number	Town Number	Range Number
Oakland	Highland	NW¼ NE¼ NE¼	23	3N	7E

Distance And Direction from Road Intersections

Street address & City of Well Location

Locate with "X" in section below — Sketch Map:

[redacted]

1 MILE

3 OWNER OF WELL:

Address

4 WELL DEPTH: (completed) 328 ft. Date of Completion Sept 9 74

5 ☑ Cable tool ☐ Rotary ☐ Driven ☐ Dug ☐ Hollow rod ☐ Jetted ☐ Bored ☐

6 USE: ☐ Domestic ☐ Public Supply ☐ Industry ☐ Irrigation ☐ Air Conditioning ☑ Commercial ☐ Test Well ☐

7 CASING: Threaded ☐ Welded ☑ Diam. 6 in. to 323 ft. Depth; in. to ft. Depth. Height: Above/Below Surface 1 ft. Weight 19.97 lbs./ft. Drive Shoe? Yes ☑ No ☐

8 SCREEN: Type Stainless Dia.: 5" Slot/Gauze 15 Length 5' Set between 323 ft. and 328 ft. Fittings: K Packer 18' Nipple 5" Plug

9 STATIC WATER LEVEL 15 ft. below land surface

10 PUMPING LEVEL below land surface 45 ft. after 8 hrs. pumping 50 g.p.m.; ft. after hrs. pumping g.p.m.

11 WATER QUALITY in Parts Per Million: Iron (Fe) Chlorides (Cl) Hardness Other

12 WELL HEAD COMPLETION: ☐ In Approved Pit ☐ Pitless Adapter ☐ 12" Above Grade

13 Well Grouted? ☐ Yes ☐ No ☐ Neat Cement ☐ Bentonite ☐ Depth: From ft. to ft.

14 Nearest Source of possible contamination feet Direction Type. Well disinfected upon completion ☐ Yes ☐ No

15 PUMP: ☒ Not installed. Manufacturer's Name Model Number HP Volts Length of Drop Pipe ft. capacity G.P.M. Type: ☐ Submersible ☐ Jet ☐ Reciprocating

2

FORMATION	THICKNESS OF STRATUM	DEPTH TO BOTTOM OF STRATUM
yellow sand + Gravel	15'	15
yellow clay	25	40
course Gravel	3	43
Blue clay	95	138
course Gravel + clay	95	233
Blue clay	80	313
Hardpan clay + Gravel	10	323
course Gravel & sand	5	328
328 sand stone		
mixed with Gravel		

USE 2ND SHEET IF NEEDED

16 Remarks, elevation, source of data, etc.

ADDED INFO BY DRILLER, ITEM NO. / CORRECTED BY / ADDITION BY / ELEVATION / DEPTH TO ROCK — RFK

17 WATER WELL CONTRACTOR'S CERTIFICATION:

This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

B W Layman & Sons — 6406
REGISTERED BUSINESS NAME — REGISTRATION NO.

Address 2307 Cass Lake Keego Harbor

Signed [signature] AUTHORIZED REPRESENTATIVE Date Sept 10 74

0-6 100M (Rev. 12/68)

2

D-LC 161

WATER WELL RECORD

ACT 294 PA 1965

MICHIGAN DEPARTMENT OF PUBLIC HEALTH

1 LOCATION OF WELL

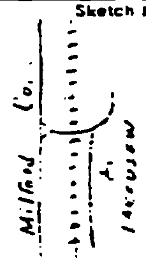
County	Township Name	Fraction	Section Number	Town Number	Range Number
Oakland	Highland	SE¼ NE¼ SW	27	3 N.	7 E.

Distance And Direction from Road Intersections

Street address & City of Well Location

Locate with "X" in section below — 1 MILE — 1 MI. — W — E

Sketch Map:



3 OWNER OF WELL:

Address

4 WELL DEPTH: (completed) 118 ft. Date of Completion Oct., 1981

5
- [x] Cable tool
- [ ] Rotary
- [ ] Driven
- [ ] Dug
- [ ] Hollow rod
- [ ] Jetted
- [ ] Bored
- [ ] ______

6 USE:
- [x] Domestic
- [ ] Public Supply
- [ ] Industry
- [ ] Irrigation
- [ ] Air Conditioning
- [ ] Commercial
- [ ] Test Well
- [ ] ______

7 CASING:
Threaded [ ] Welded [x]

Diam. 4 in. to 114 ft. Depth; ____ in. to ____ ft. Depth

Height: Above/Below Surface 1 ft.

Weight 10.79 lbs./ft.

Drive Shoe? Yes [x] No [ ]

2 FORMATION

FORMATION	THICKNESS OF STRATUM	DEPTH TO BOTTOM OF STRATUM
Brown clay & sand	18'	18'
Brown clay & gravel	21'	39'
Grey sand, clay & stones	06'	45'
Blue clay & sand	22'	67'
Blue clay & gravel	19'	86'
Fine sand & gravel	28'	114'
Water-bearing gravel	04'	118'

USE A 2ND SHEET IF NEEDED

8 SCREEN:
Type: Stainless Dia.: 3 5/8"

Slot/Gauze 20 Length 4'

Set between 114 ft. and 118 ft.

Fittings: K-Packer - Nipple - Plug

9 STATIC WATER LEVEL
14 ft. below land surface

10 PUMPING LEVEL below land surface
42 ft. after 3 hrs. pumping 20 g.p.m.

____ ft. after ____ hrs. pumping ____ g.p.m.

11 WATER QUALITY in Parts Per Million:
Iron (Fe) ____ Chlorides (Cl) ____

Hardness ____ Other ____

12 WELL HEAD COMPLETION:
- [ ] In Approved Pit
- [x] Pitless Adapter
- [ ] 12" Above Grade

13 Well Grouted? [ ] Yes [x] No
- [ ] Neat Cement
- [ ] Bentonite
- [ ] ______

Depth: From ____ ft. to ____ ft.

14 Nearest Source of possible contamination
50 feet W Direction Septic Type

Well disinfected upon completion [x] Yes [ ] No

15 PUMP:
- [ ] Not installed

Manufacturer's Name Sta-Rite

Model Number 14P4C02S HP ½ Volts 230

Length of Drop Pipe 63 ft. capacity 14 G.P.M.

Type: [x] Submersible [ ] Jet [ ] Reciprocating

DEC 3 1981

16 Remarks, elevation, source of data, etc.
WOULD INFO. BY DRILLER, ITEM NO.

CORRECTED NO

ADDITION NO

dlv

D. R. L.

17 WATER WELL CONTRACTOR'S CERTIFICATION:
This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

James H. Layman — REGISTERED BUSINESS NAME — 0645 REGISTRATION NO.

Address 10275 Eagle Rd., Davisburg, Mich.

Signed Eualdo Lehman (AUTHORIZED REPRESENTATIVE) Date 10/14/81

D67d 100M (Rev. 12-68)

GEOLOGICAL SURVEY COPY

16

WATER WELL RECORD
ACT 294 PA 1965

MICHIGAN DEPARTMENT OF PUBLIC HEALTH

25-

1 LOCATION OF WELL

County	Twp.	Fraction	Section No.	Town	Range
Oakland	Highland	SW¼ SW¼ SE¼	25	3 N/S	7 E/W

Distance And Direction from Road Intersection: 300' from Duck Lake Rd. OWNER No.

Street address & City of Well Location

3 OWNER OF WELL:

Address

2 FORMATION	THICKNESS OF STRATUM	DEPTH TO BOTTOM OF STRATUM
Top Soil	21	
sand & gravel	20	41
clay & gravel	30	71
hard pan	10	81
sand & gravel	29	110

4 WELL DEPTH: (completed) 110' ft. Date of Completion 3/15/67

5 ☒ Cable tool ☐ Rotary ☐ Driven ☐ Dug ☐ Hollow rod ☐ Jetted ☐ Bored ☐ ___

6 USE: ☒ Domestic ☐ Public Supply ☐ Industry ☐ Irrigation ☐ Air Conditioning ☐ Commercial ☐ Test Well ☐ ___

7 CASING: Diam. Threaded ☐ Welded ☒ Height: Above/Below surface ___ ft.
4 in. to 110 ft. Depth Weight ___ lbs./ft.
___ in. to ___ ft. Depth Drive Shoe? Yes ☒ No ☐

8 SCREEN:
Type: Red Brass Dia.: 3"
Slot/Gauze 12 Length 5' 6" inch
Set between 104 ft. and ___ ft.
Fittings:

9 STATIC WATER LEVEL
___ ft. below land surface

10 PUMPING LEVEL below land surface
20 ft. after 6 hrs. pumping 20 g.p.m.
15 ft. after 6 hrs. pumping 20 g.p.m.

11 WATER QUALITY in Parts Per Million:
Iron (Fe) ___ Chlorides (Cl) ___
Hardness ___

12 WELL HEAD COMPLETION: ☐ In Approved Pit ☒ Pitless Adapter ☒ 12" Above Grade

13 GROUTING:
Well Grouted? ☐ Yes ☒ No
Material: ☐ Neat Cement ☐ ___
Depth: From ___ ft. to ___ ft.

14 SANITARY:
Nearest Source of possible contamination
200' feet ___ Direction ___ Type
Well disinfected upon completion ☒ Yes ☐ No

15 PUMP:
Manufacturer's Name Hatten
Model Number P629 HP ½ 220
Length of Drop Pipe 30 ft. capacity 15 G.P.M.
Type: ☒ Submersible ☐ ___ ☐ Jet ☐ Reciprocating 506

16 Remarks, elevation, source of data, etc. EL ≈ 975 - Topo

ADDED INFO. BY DRILLER, ITEM NO.

CORRECTED BY:

ADDITION BY:

17 WATER WELL CONTRACTOR'S CERTIFICATION:
This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

D. Kirby Kirkpatrick Drilling 0104
REGISTERED BUSINESS NAME REGISTRATION NO.

Address 2687 Highland

Signed D. Kirby Date 3/15/67
AUTHORIZED REPRESENTATIVE

D67D 100M 6-66 PINK 1

JUL 10 1980

WATER WELL RECORD
ACT 294 PA 1965

MICHIGAN DEPARTMENT OF PUBLIC HEALTH

1 LOCATION OF WELL

County	Township Name	Fraction	Section Number	Town Number	Range Number
OCEANA	HIGHLAND	NE ¼ NW ¼ NE ¼	24	3 N.	17 E.

Distance And Direction from Road Intersections

Street address & City of Well Location

Locate with "X" in section below

[redacted]

[redacted]

3 OWNER OF WELL:

Address [redacted]

4 WELL DEPTH: (completed) Date of Completion

97 ft.

5 ☒ Cable tool ☐ Rotary ☐ Driven ☐ Dug ☐ Hollow rod ☐ Jetted ☐ Bored ☐ ____

6 USE: ☒ Domestic ☐ Public Supply ☐ Industry ☐ Irrigation ☐ Air Conditioning ☐ Commercial ☐ Test Well ☐ ____

7 CASING: Threaded ☐ Welded ☒ Diam. 4 in. to 90 ft. Depth; ____ in. to ____ ft. Depth

Height: Above/Below Surface 1 ft. Weight 1479 lbs./ft. Drive Shoe? Yes ☒ No ☐

2 FORMATION	THICKNESS OF STRATUM	DEPTH TO BOTTOM OF STRATUM
Brown Sand gravel	20	20
Brown clay gravel	20	40
Brown Sand	10	50
Blue clay gravel	30	80
gray sand fine	10	90
gray Sand coarse	7	97

USE A 2ND SHEET IF NEEDED

8 SCREEN:

Type Stainless Dia.: ____

Slot/Gauze 15 Length 6 ft

Set between 91 ft. and 97 ft.

Fittings: K-packer - plug - 12" riser

9 STATIC WATER LEVEL

50 ft. below land surface

10 PUMPING LEVEL below land surface

50 ft. after 2 hrs. pumping 50 g.p.m.

____ ft. after ____ hrs. pumping ____ g.p.m.

11 WATER QUALITY in Parts Per Million:

Iron (Fe) ____ Chlorides (Cl) ____

Hardness ____ Other ____

12 WELL HEAD COMPLETION: ☐ In Approved Pit ☒ Pitless Adapter ☐ 12" Above Grade

13 Well Grouted? ☐ Yes ☒ No ☐ Neat Cement ☐ Bentonite ☐ ____

Depth: From ____ ft. to ____ ft.

14 Nearest Source of possible contamination

____ feet ____ Direction ____ Type

Well disinfected upon completion ☐ Yes ☐ No

15 PUMP: ☐ Not installed

Manufacturer's Name ____

Model Number ____ HP ____ Volts ____

Length of Drop Pipe ____ ft. capacity ____ G.P.M.

Type: ☐ Submersible ☐ Jet ☐ Reciprocating

JUL 2 1980

16 Remarks, elevation, source of data, etc.

ADDED INFO BY DRILLER ITEM 8

*CORRECTED BY

**ADDITION BY

ELEVATION

DEPTH TO PUMP

17 WATER WELL CONTRACTOR'S CERTIFICATION:

This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

B. Wilcox and Sons — 0406

REGISTERED BUSINESS NAME — REGISTRATION NO.

Address 2302 Cass Lk Rd Keego Harbor

Signed [signature] — Date ____

AUTHORIZED REPRESENTATIVE

D67d 100M (Rev. 12-68)

GEOLOGICAL SURVEY COPY

PERMIT NUMBER

WATER WELL AND PUMP RECORD

AUG 02 1984

1 LOCATION OF WELL

County: OAKLAND
Township Name: HIGHLAND
Fraction: ¼ ¼ ¼
Section Number: 13
Town Number: 3 N
Range Number: 7 E/W

Distance And Direction from Road Intersection:

Street Address & City of Well Location:

Locate with "x" in Section Below. Sketch Map

1 MILE

3 OWNER OF WELL

Address

Address Same As Well Location? [X] Yes [ ] No

4 WELL DEPTH (completed): 82 ft
Date of Completion: 4/21/84

5 [X] Cable tool [ ] Rotary [ ] Driven [ ] Dug
[ ] Hollow rod [ ] Auger [ ] Jetted [ ]

6 USE [X] Domestic [ ] Type I Public [ ] Type III Public
[ ] Irrigation [ ] Type IIa Public [ ] Heat pump
[ ] Test Well [ ] Type IIb Public [ ]

2 FORMATION DESCRIPTION

FORMATION DESCRIPTION	THICKNESS OF STRATUM	DEPTH TO BOTTOM OF STRATUM
MUDDY BROWN SAND	46	46
CLAY	16	62
SAND + GRAVEL	2	64
CLAY	6	70
SAND + CLAY	5	75
SAND SOME GRAVEL	7	82

USE A 2ND SHEET IF NEEDED

RECEIVED
Mich. Dept. of Public Health
JUN 26 1984
Bureau of Environmental and Occupational Health - GWQS

7 CASING [X] Steel [X] Threaded
Diameter [ ] Plastic [ ] Welded
4 in. to 78 ft. depth
in. to ft. depth
Grouted Drill hole Diameter
in. to ft. depth
in. to ft. depth
Height Above/Below Surface 1 ft
Weight lbs./ft.
Drive Shoe [X] Yes [ ] No

8 SCREEN [ ] Not installed
Type WIRE WOUND Diameter 3"
Slot/Gauge 15 Length 4'
Set between 78 ft. and 82 ft.
FITTINGS [X] K Packer [ ] Lead Packer [ ] Bremer Check
[ ] Blank above screen 18" ft. Other

9 STATIC WATER LEVEL
4 ft. below land surface [ ] Flow

10 PUMPING LEVEL below land surface
ft. after 4 hrs. pumping at 20 G.P.M.
ft. after hrs. pumping at G.P.M.

11 WELL HEAD COMPLETION [X] Pitless adapter [ ] 12" above grade
[ ] Basement offset [ ] Approved pit

12 WELL GROUTED? [X] No [ ] Yes From ft. to ft.
[ ] Neat cement [ ] Bentonite [ ] Other
No. of bags of cement Additives

13 Nearest source of possible contamination
Type SEPTIC Distance 52' Direction WEST
Well disinfected upon completion? [X] Yes [ ] No

14 PUMP [ ] Not installed [ ] Pump installation Only
Manufacturer's name RED JACKET
Model number 75N1 CNI20C 3/4 Volts 230
Length of Drop Pipe 63 ft. capacity 15 G.P.M.
TYPE [X] Submersible [ ] Jet
PRESSURE TANK
Manufacturer's name X TROL
Model number WX203 Capacity 12 Gallons

15 Remarks, elevation, source of data, etc.

ADDED INFO BY DRILLER, IT&M No.
*CORRECTED BY
**ADDITION BY
ELEVATION
DEPTH TO [illegible]

16 WATER WELL CONTRACTOR'S CERTIFICATION
This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

PERSONS — 0512
REGISTERED BUSINESS NAME — REGISTRATION NO.
Address 10275 PONTIAC LK RD
Signed [signature] Date 4/28/84
AUTHORIZED REPRESENTATIVE

0670 Rev. 10/80

GEOLOGICAL SURVEY [illegible]

WATER WELL AND PUMP RECORD

PERMIT NUMBER

1 LOCATION OF WELL

County	Township Name	Fraction	Section Number	Town Number	Range Number
Oakland	Highland	SW¼ SW¼ NE¼	13	3 N/S	7 E/W

Distance And Direction from Road Intersection

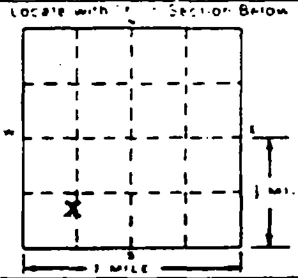
Street Address & City of Well Location

3 OWNER OF WELL

Address

Address Same As Well Location? ☐ Yes ☐ No

Locate with "X" in Section Below — Sketch Map



4 WELL DEPTH (completed) 74 ft. — Date of Completion 9-8-84

5 ☒ Cable tool ☐ Rotary ☐ Driven ☐ Dug ☐ Hollow rod ☐ Auger ☐ Jetted ☐

6 USE ☒ Domestic ☐ Type I Public ☐ Type III Public ☐ Irrigation ☐ Type IIa Public ☐ Heat pump ☐ Test Well ☐ Type IIb Public ☐

7 CASING Diameter ☒ Steel ☐ Threaded ☐ Plastic ☒ Welded — 4 in. to 70 ft. depth — Height Above/Below Surface ___ ft. — Weight ___ lbs./ft. — Grouted Drive Hole Diameter ___ in. to ___ ft. depth — Drive Shoe ☒ Yes ☐ No

FORMATION DESCRIPTION	THICKNESS OF STRATUM	DEPTH TO BOTTOM OF STRATUM
Brown clay & gravel		48
Coarse gravel - blue clay	15	63
Med. sand, gravel - water	11	74

USE A 2ND SHEET IF NEEDED

8 SCREEN ☐ Not Installed — Type Johnson — Diameter 3" — Slot 12 — Length 48 — Set between 70 ft. and 74 ft. — FITTINGS ☒ K-Packer ☐ Lead Packer ☐ Bremer Check ☐ Blank above screen ___ ft. — Other 1' nipple

9 STATIC WATER LEVEL 47 ft. below land surface ☐ Flow

10 PUMPING LEVEL below land surface — 58 ft. after 1½ hrs. pumping at 60 G.P.M. — ___ ft. after ___ hrs. pumping at ___ G.P.M.

11 WELL HEAD COMPLETION ☒ Pitless adapter ☐ 12" above grade ☐ Basement offset ☐ Approved pit

12 WELL GROUTED? ☐ No ☐ Yes From ___ to ___ ft. ☐ Neat cement ☐ Bentonite ☐ Other ___ — No. of bags of cement ___ Additives ___

13 Nearest source of possible contamination — Type septic — Distance 50' — Direction SW — Well disinfected upon completion ☒ Yes ☐ No

14 PUMP ☐ Not installed ☐ Pump installation Only — Manufacturer's name Red Jacket — Model number ___ HP ___ Volts ___ — Length of Drop Pipe 58 ft. capacity ___ G.P.M. — TYPE ☒ Submersible ☐ Jet — PRESSURE TANK Manufacturer's name ___ — Model number ___ Capacity ___ Gallons

15 Remarks, elevation, source of data, etc.

16 WATER WELL CONTRACTOR'S CERTIFICATION

This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

Fettig's Well Drilling — 0413
REGISTERED BUSINESS NAME — REGISTRATION NO.

Address 5575 Jackson Blvd. Davisburg

Signed [signature] Pres. — Date 5-1-85
AUTHORIZED REPRESENTATIVE

Rev. 10-80

AUG 16 19

WATER WELL RECORD
ACT 294 PA 1965

MICHIGAN DEPARTMENT OF PUBLIC HEALTH

1 LOCATION OF WELL

County	Township Name	Fraction	Section Number	Town Number	Range Number
OAKLAND	HIGHLAND	NW ¼ N ¼ [redacted] ¼	26	3 N	7 E

Distance And Direction from Road Intersection: [redacted]

3 OWNER OF WELL: [redacted]

Locate with "X" in section below — Sketch Map: [redacted]

4 WELL DEPTH: (completed) 79 ft. Date of Completion 7-11-78

5 ☒ Cable tool ☐ Rotary ☐ Driven ☐ Dug ☐ Hollow rod ☐ Jetted ☐ Bored ☐ ____

6 USE: ☒ Domestic ☐ Public Supply ☐ Industry ☐ Irrigation ☐ Air Conditioning ☐ Commercial ☐ Test Well ☐ ____

7 CASING: Threaded ☒ Welded ☐ Diam. 3 in. to 75½ ft. Depth; ____ in. to ____ ft. Depth. Height: Above Surface 18in. ft. Weight 11 lbs./ft. Drive Shoe? Yes ☒ No ☐

2 FORMATION	THICKNESS OF STRATUM	DEPTH TO BOTTOM OF STRATUM
SAND	42	42
SAND & CLAY	16	58
GRAVEL & CLAY	2	60
CLAY	4	64
SAND CLAY & GRAVEL	3	67
CLAY	6	73
GRAVEL & SAND	6	79

8 SCREEN: Type: Stainless Steel Dia.: 3" Slot/Gauze 12 Length 4 Ft Set between 75½ ft. and 79 ft. Fittings: K-Packer

9 STATIC WATER LEVEL 20 ft. below land surface

10 PUMPING LEVEL below land surface 20 ft. after 3 hrs. pumping 15 g.p.m. ____ ft. after ____ hrs. pumping ____ g.p.m.

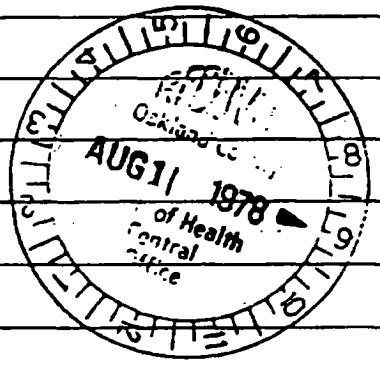
11 WATER QUALITY in Parts Per Million: Iron (Fe) ____ Chlorides (Cl) ____ Hardness ____ Other ____

12 WELL HEAD COMPLETION: ☐ In Approved Pit ☒ Pitless Adapter ☐ 12" Above Grade

13 Well Grouted? ☐ Yes ☒ No ☐ Neat Cement ☐ Bentonite ☐ ____ Depth: From ____ ft. to ____ ft.

14 Nearest Source of possible contamination 53 feet N Direction Septic Type. Well disinfected upon completion ☒ Yes ☐ No

15 PUMP: ☐ Not installed. Manufacturer's Name Valley. Model Number 5120811F3552 HP ½ Volts 230. Length of Drop Pipe 35 ft. capacity 12 G.P.M. Type: ☒ Submersible ☐ Jet ☐ Reciprocating



USE A 2ND SHEET IF NEEDED

16 Remarks, elevation, source of data, etc.

...LER. ITEM NO.

...ION BY MB

ELEVATION

DEPTH TO ROCK

17 WATER WELL CONTRACTOR'S CERTIFICATION: This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

Gilley Well Drilling — REGISTERED BUSINESS NAME — 1506 REGISTRATION NO.

Address 3910 Cole Holly Mi. 48442

Signed Howard A Gilley — AUTHORIZED REPRESENTATIVE — Date 7/14/78

D67d 100M (Rev. 12-68)

GEOLOGICAL SURVEY COPY

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APR 27 1981

WATER WELL RECORD

ACT 294 PA 1965

MICHIGAN DEPARTMENT OF PUBLIC HEALTH

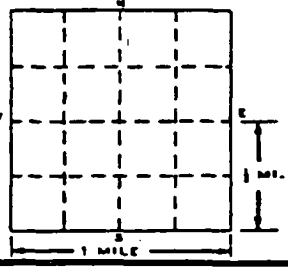
1 LOCATION OF WELL — SW NE NE

County	Township Name	Fraction	Section Number	Town Number	Range Number
Oakland	Highland	NE¼ NE¼ SW¼	26	3 N/S.	7 E/W.

Distance And Direction from Road Intersections: 600 ft S of Livingston + Grand

Street address & City of Well Location:

Locate with "X" in section below — Sketch Map:



3 OWNER OF WELL:

Address: [illegible]

4 WELL DEPTH: (completed) 125 ft. — Date of Completion 12-17-80

5 ☒ Cable tool ☐ Rotary ☐ Driven ☐ Dug ☐ Hollow rod ☐ Jetted ☐ Bored ☐ ____

6 USE: ☒ Domestic ☐ Public Supply ☐ Industry ☐ Irrigation ☐ Air Conditioning ☐ Commercial ☐ Test Well ☐

7 CASING: Threaded ☒ Welded ☐ — Height: Above/Below Surface 1 ft.

Diam. 4" ____ in. to ____ ft. Depth — Weight 11 lbs./ft.

____ in. to ____ ft. Depth — Drive Shoe? Yes ☒ No ☐

2 FORMATION	THICKNESS OF STRATUM	DEPTH TO BOTTOM OF STRATUM
Sand/clay/s Gravel	30	30
Sand/Gravel	50	80
Sand/Gravel/B. Clay	18	98
Sand/Gravel/S water	10	108
Sand/Gravel/W. Bearing	17	125

8 SCREEN:

Type: Johnson Stainless — Dia.: 4"

Slot/Gauge 12/19 — Length 8 ft 6 in

Set between 117 ft. and 125 ft.

Fittings: K Packer-Plug-Inlet pipe

9 STATIC WATER LEVEL

60 ft. below land surface

10 PUMPING LEVEL below land surface

50 ft. after 1 hrs. pumping 45 g.p.m.

50 ft. after 1 hrs. pumping 45 g.p.m.

11 WATER QUALITY in Parts Per Million:

Iron (Fe) ____ Chlorides (Cl) ____

Hardness ____ Other ____

12 WELL HEAD COMPLETION: ☐ In Approved Pit ☒ Pitless Adapter ☒ 12" Above Grade

13 Well Grouted? ☐ Yes ☐ No ☐ Neat Cement ☐ Bentonite ☐ ____

Depth: From ____ ft. to ____ ft.

14 Nearest Source of possible contamination: 60 feet NE Direction Septic Type

Well disinfected upon completion ☒ Yes ☐ No

15 PUMP: ☐ Not installed

Manufacturer's Name F-M-W

Model Number 15CH-10 HP 1½ Volts 230

Length of Drop Pipe 105 ft. capacity 27 G.P.M.

Type: ☒ Submersible ☐ Jet ☐ Reciprocating

USE A 2ND SHEET IF NEEDED

16 Remarks, elevation, source of data, etc.

ADDED INFO BY DRILLER, ITEM NO.

*CORRECTED BY

**ADDITION BY

ELEVATION

DEPTH TO ROCK

d 18

17 WATER WELL CONTRACTOR'S CERTIFICATION:

This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

Paul Zelony Well Drilling — 0311

REGISTERED BUSINESS NAME — REGISTRATION NO.

Address 4794 N. Duck Lk Rd. Highland

Signed Paul Zelony — Date 2-21-80

AUTHORIZED REPRESENTATIVE

D67d 100M (Rev. 12-68)

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3 APR 19 1977

WATER WELL RECORD

ACT 294 PA 1965

MICHIGAN DEPARTMENT OF PUBLIC HEALTH

1 LOCATION OF WELL

County	Township Name	Fraction	Section Number	Town Number	Range Number
Oakland	Highland	¼ ¼ ¼	26	3 N/S.	7 E/W.

Distance And Direction from Road Intersection: Beaumont & Livingston Rd ...

Street address & City of Well Location

Locate with "X" in section below — W, E, S, 1 MI., 1 MILE

Sketch Map:

3 OWNER OF WELL

Address

4 WELL DEPTH: (completed) 95 ft. Date of Completion Feb 76

5 ☑ Cable tool ☐ Rotary ☐ Driven ☐ Dug ☐ Hollow rod ☐ Jetted ☐ Bored ☐ ____

6 USE: ☑ Domestic ☐ Public Supply ☐ Industry ☐ Irrigation ☐ Air Conditioning ☐ Commercial ☐ Test Well ☐

7 CASING: Threaded ☑ Welded ☐ Diam. 4 in. to 95 ft. Depth; ____ in. to ____ ft. Depth
Height: Above/Below Surface 1 ft. Weight 11 lbs./ft. Drive Shoe? Yes ☑ No ☐

2

FORMATION	THICKNESS OF STRATUM	DEPTH TO BOTTOM OF STRATUM
Gravel	48'	48'
Clay	4'	52'
Muddy Gravel	16'	68'
Clay	7'	75'
Fine Shell	5'	80'
Water Sand	15	95'

ADDED INFO BY DRILLER ITEM NO.
*CORRECTED BY MB
**ADDITION BY
ELEVATION
DEPTH TO ROCK

APR 12 1977

USE A 2ND SHEET IF NEEDED

8 SCREEN: Type: Stainless Dia.: 4 Slot/Gauze #18 Length 6 Set between 89 ft. and 95 ft. Fittings: Cook Alloy & Corp.

9 STATIC WATER LEVEL 50 ft. below land surface

10 PUMPING LEVEL below land surface 60 ft. after 8 hrs. pumping 20 g.p.m.; ____ ft. after ____ hrs. pumping ____ g.p.m.

11 WATER QUALITY in Parts Per Million: Iron (Fe) ____ Chlorides (Cl) ____ Hardness ____ Other ____

12 WELL HEAD COMPLETION: ☐ In Approved Pit ☑ Pitless Adapter ☐ 12" Above Grade

13 Well Grouted? ☐ Yes ☑ No ☐ Neat Cement ☐ Bentonite ☐ ____ Depth: From ____ ft. to ____ ft.

14 Nearest Source of possible contamination 70 feet W Direction Septic Type. Well disinfected upon completion ☑ Yes ☐ No

15 PUMP: ☐ Not installed Manufacturer's Name Hampton Model Number Deluxe HP ½ Volts 230 Length of Drop Pipe 75 ft. capacity 10 G.P.M. Type: ☑ Submersible ☐ Jet ☐ Reciprocating

16 Remarks, elevation, source of data, etc.

Drillers Log
C. Hauswirth

17 WATER WELL CONTRACTOR'S CERTIFICATION:
This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

John H. Rosenthal Well — 6027
REGISTERED BUSINESS NAME — REGISTRATION NO.

Address 2837 Pleasant Valley

Signed [signature] AUTHORIZED REPRESENTATIVE Date Apr 76

D67d 100M (Rev. 12-68)

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WATER WELL RECORD

ACT 294 PA 1965

26

MICHIGAN DEPARTMENT OF PUBLIC HEALTH

26

1 LOCATION OF WELL

County	Twp.	Fraction	Section No.	Town	Range
OAKLAND	HIGHLAND	NE SE ¼ NW ¼ SE ¼	26	3 N.	7 E.

Distance And Direction from Road Intersections: 3/4 MI. S. GRUBB RD.

OWNER No. ______

Street address & City of Well Location

3 OWNER OF WELL:

Address

2 FORMATION	THICKNESS OF STRATUM	DEPTH TO BOTTOM OF STRATUM
RED SAND	70'	70'
Gray WATER SAND	10'	80'

4 WELL DEPTH: (completed) 80 ft. Date of Completion 8-8-67

5 ☒ Cable tool ☐ Rotary ☐ Driven ☐ Dug ☐ Hollow rod ☐ Jetted ☐ Bored ☐ ____

6 USE: ☒ Domestic ☐ Public Supply ☐ Industry ☐ Irrigation ☐ Air Conditioning ☐ Commercial ☐ Test Well ☐ ____

7 CASING: Threaded ☒ Welded ☐
Diam. 4 in. to 76 ft. Depth
____ in. to ____ ft. Depth
Height: Above/Below surface 1 ft.
Weight 11 ½ lbs/ft.
Drive Shoe? Yes ☒ No ☐

8 SCREEN:
Type STAINLESS Dia.: 3"
Slot/Gauze 10 Length 6'-6"
Set between 76 ft. and 80 ft.
Fittings: 2-3" PIPE 3" PLUG 3" PACKER COUPLING

9 STATIC WATER LEVEL
25 ft. below land surface (+1025)

10 PUMPING LEVEL below land surface
70 ft. after 3 hrs. pumping 60 g.p.m.
____ ft. after ____ hrs. pumping ____ g.p.m.

11 WATER QUALITY in Parts Per Million:
Iron (Fe) ____ Chlorides (Cl) ____
Hardness ____

12 WELL HEAD COMPLETION: ☐ In Approved Pit ☒ Pitless Adapter ☐ 12" Above Grade

13 GROUTING:
Well Grouted? ☐ Yes ☐ No
Material: ☐ Neat Cement ☐ ____
Depth: From ____ ft. to ____ ft.

14 SANITARY:
Nearest Source of possible contamination
80 feet W Direction SEPTIC Type
Well disinfected upon completion ☒ Yes ☐ No

15 PUMP:
Manufacturer's Name RAPIDAYTON
Model Number ____ HP 1/2
Length of Drop Pipe 42 ft. capacity 15 G.P.M.
Type: ☒ Submersible ☐ ____ ☐ Jet ☐ Reciprocating

16 Remarks, elevation, source of data, etc. elev. 1025±10 ...
ADDED ... BY DRILLER, ITEM NO.
CORRECTED BY:
ADDITION BY:
St. w. el. 1025±

17 WATER WELL CONTRACTOR'S CERTIFICATION:
This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

OSCAR WOODRUM WELL DRILL — 6838
REGISTERED BUSINESS NAME — REGISTRATION NO.

Address 57 W. BEVERLY ST.

Signed FRANCIS WOODRUM Date 9-8-67
AUTHORIZED REPRESENTATIVE

D67D 100M 6-66

GEOLOGICAL SURVEY COPY

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WATER WELL RECORD
ACT 294 PA 1965

1957

OF PUBLIC HEALTH

14

1 LOCATION OF WELL

County	Twp	Fraction	Section No.	Town	Range
Oakland	Highland	SW ¼ SW ¼ NE ¼	14	3 N	7 E

Distance And Direction from Road Intersections

OWNER No. ________

Street address & City of Well Location

3 OWNER OF WELL

Address

2 FORMATION	THICKNESS OF STRATUM	DEPTH TO BOTTOM OF STRATUM
Coarse sand boulders	0	50'
Cobbles & sand	20	70'
hard pan	15	85'
silt hard pan	20'	105
water bearing sand	15'	120'
pr		

4 WELL DEPTH (completed) 120 ft. Date of Completion 5/29/67

5 [X] Cable tool [ ] Rotary [ ] Driven [ ] Dug [ ] Hollow rod [ ] Jetted [ ] Bored [ ] ___

6 USE: [X] Domestic [ ] Public Supply [ ] Industry [ ] Irrigation [ ] Air Conditioning [ ] Commercial [ ] Test Well [ ] ___

7 CASING: Threaded [ ] Welded [X] Height: Above/Below
Diam. 4 in. to ___ ft. Depth surface ___ ft.
Weight steel lbs/ft.
___ in. to ___ ft. Depth Drive Shoe? Yes [X] No [ ]

8 SCREEN
Type R Brass Dia.: 3"
Slot/Gauze ___ Length 9'-6 overall
Set between 112 ft. and 120 ft.
Fittings: 3' nip.

9 STATIC WATER LEVEL
40 ft. below land surface (+955').

10 PUMPING LEVEL below land surface
40 ft. after 8 hrs. pumping 20 g.p.m.
40 ft. after 12 hrs. pumping 20 g.p.m.

11 WATER QUALITY in Parts Per Million:
Iron (Fe) ___ Chlorides (Cl) ___
Hardness ___

12 WELL HEAD COMPLETION: [X] In Approved Pit built by owner
[ ] Pitless Adapter [ ] 12" Above Grade

13 GROUTING:
Well Grouted? [ ] Yes [X] No
Material: [ ] Neat Cement [ ] ___
Depth: From ___ ft. to ___ ft.

14 SANITARY:
Nearest Source of possible contamination
100 feet ___ Direction septic Type
Well disinfected upon completion [X] Yes [ ] No

15 PUMP:
Manufacturer's Name Red Jacket
Model Number R5CH 1 HP ½
Length of Drop Pipe 60 ft. capacity 15 G.P.M.
Type: [X] Submersible [ ] ___
[ ] Jet [ ] Reciprocating

16 Remarks, elevation, source of data, etc. E.. 1025' Topo.

ADDED INFO. BY DRILLER, ITEM NO.

CORRECTED BY:

ADDITION BY:

17 WATER WELL CONTRACTOR'S CERTIFICATION:
This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

D. Kirby Well Drilling 0104
REGISTERED BUSINESS NAME REGISTRATION NO.

Address 268 Highland Rd

Signed D Kirby Date 5/26/67
AUTHORIZED REPRESENTATIVE

D67D 100M 6-66 AUG 23 1967

GEOLOGICAL SURVEY COPY

ACT 294 PA 1965 MAR 0 1967 OF PUBLIC HEALTH

1 LOCATION OF WELL

County	Twp.	Fraction	Section No.	Town	Range
Oakland	Highland	SE ¼ SW ¼ NW ¼	22	3 N/S	7 E/W

Distance And Direction from Road Intersections

OWNER No.

Street address & City of Well Location

3 OWNER OF WELL:
Address: Contractors General Co.
23207 Lahser Road
Southfield, Michigan

2 FORMATION	THICKNESS OF STRATUM	DEPTH TO BOTTOM OF STRATUM
Yellow Dry Gravel	20'	20'
Sandy Hardpan	40'	60'
Boulder	5'	65'
Hardpan	30'	95'
Sandy Hardpan	12'	107'
Fine Sand	5'	112'
Putty Sand	3'	115'
Hole bottomed at 112'		

4 WELL DEPTH: (completed) 112 ft. Date of Completion 2-14-67

5 ☒ Cable tool ☐ Rotary ☐ Driven ☐ Dug ☐ Hollow rod ☐ Jetted ☐ Bored ☐ ___

6 USE ☐ Domestic ☐ Public Supply ☒ Industry ☐ Irrigation ☐ Air Conditioning ☐ Commercial ☐ Test Well ☐ ___

7 CASING: Diam. 6 in. to 109 ft. Depth; Threaded ☒ Welded ☐; ___ in. to ___ ft. Depth
Height: Above/Below surface 2 ft.
Weight 19.45 lbs/ft.
Drive Shoe? Yes ☒ No ☐

8 SCREEN Johnson
Type: Stainless steel Dia.: 6"
Slot/Gauge 10 Length 5'
Set between 107 ft. and 112 ft.
Fittings: 5" x 17" nipple

9 STATIC WATER LEVEL
52 ft. below land surface

10 PUMPING LEVEL below land surface
105 ft. after 8 hrs. pumping 25 g.p.m.
___ ft. after ___ hrs. pumping ___ g.p.m.

11 WATER QUALITY in Parts Per Million:
Iron (Fe) 1.7 Chlorides (Cl) 34.2
Hardness 324.9

12 WELL HEAD COMPLETION: ☐ In Approved Pit ☒ Pitless Adapter ☐ 12" Above Grade

13 GROUTING:
Well Grouted? ☐ Yes ☒ No
Material: ☐ Neat Cement ☐ ___
Depth: From ___ ft. to ___ ft.

14 SANITARY: Not known
Nearest Source of possible contamination
___ feet ___ Direction ___ Type
Well disinfected upon completion ☐ Yes ☐ No

15 PUMP:
Manufacturer's Name Jacuzzi Bros.
Model Number 15S4CT2 HP 1½
Length of Drop Pipe 95 ft. capacity 23½ G.P.M.
Type: ☒ Submersible ☐ ___ ☐ Jet ☐ Reciprocating

16 Remarks, elevation, source of data, etc.
ADDED INFO. BY DRILLER. ITEM NO.
CORRECTED BY:
ADDITION BY: RTS 4/3/67
MAR 30

17 WATER WELL CONTRACTOR'S CERTIFICATION:
This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.
O.O. Corsaut Inc. (REGISTERED BUSINESS NAME) 0025 (REGISTRATION NO.)
Address 15101 W. 11 Mile Road, Oak Park, Michigan
Signed Owen Corsaut (AUTHORIZED REPRESENTATIVE) Date March 23, 1967

D67D 100M 6-66

GEOLOGICAL SURVEY COPY

DEC 30 1975

WATER WELL RECORD

ACT 294 PA 1965

MICHIGAN DEPARTMENT OF PUBLIC HEALTH

2

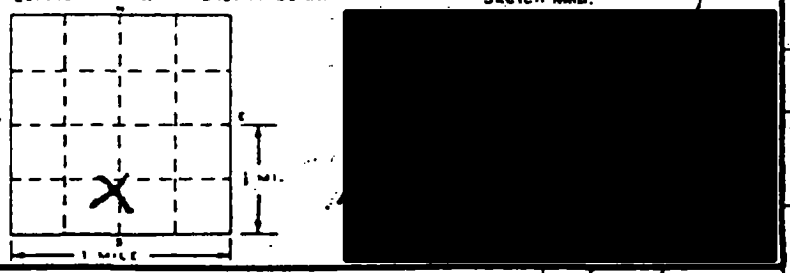
1 LOCATION OF WELL SW NW 1/4 23

County: Oakland | Township Name: Highland | Fraction: S.E. | Section Number: 23 | Town Number: 3 N. | Range Number: 7 E.

Distance And Direction from Road Intersection:

Street Address & City of Well Location:

Locate with "X" in Section below | Sketch Map:



3 OWNER:

Address:

4 WELL DEPTH: (completed) 85 ft. Date of Completion

5 ☐ Cable tool ☐ Rotary ☐ Driven ☐ Dug ☐ Hollow rod ☐ Jetted ☐ Bored ☐

6 USE: ☐ Domestic ☐ Public Supply ☐ Industry ☐ Irrigation ☐ Air Conditioning ☐ Commercial ☐ Test Well ☐

7 CASING: Threaded ☐ Welded ☒ Diam. 4 in. to 85 ft. Depth; ___ in. to ___ ft. Depth. Height: Above/Below Surface ___ ft. Weight ___ lbs./ft. Drive Shoe? Yes ☐ No ☐

2 FORMATION	THICKNESS OF STRATUM	DEPTH TO BOTTOM OF STRATUM
Top Soil & Sand		5'
Clay & Sand		70'
Sand & Gravel		85'

8 SCREEN: Type: Johnson Dia.: 4" Slot/Gauze 12 Length 5' Set between 80 ft. and 85 ft. Fittings:

9 STATIC WATER LEVEL 25 ft. below land surface

10 PUMPING LEVEL below land surface 42 ft. after ___ hrs. pumping 30 g.p.m.

___ ft. after ___ hrs. pumping ___ g.p.m.

11 WATER QUALITY in Parts Per Million: Iron (Fe) ___ Chlorides (Cl) ___ Hardness ___ Other ___

12 WELL HEAD COMPLETION: ☐ In Approved Pit ☒ Pitless Adapter ☒ 12" Above Grade

13 Well Grouted? ☐ Yes ☐ No ☐ Neat Cement ☐ Bentonite ☐ ___ Depth: From ___ ft. to ___ ft.

14 Nearest Source of possible contamination 50 feet West Direction Septic Type

Well disinfected upon completion ☒ Yes ☐ No

15 PUMP: ☐ Not installed Manufacturer's Name Peerless Model Number ___ HP 1/2 Volts 230 Length of Drop Pipe 42 ft. capacity 7 G.P.M.

Type: ☒ Submersible ☐ Jet ☐ Reciprocating

USE A 2ND SHEET IF NEEDED

16 Remarks, elevation, source of data, etc. DB

ADDED BY DRILLER, ITEM NO.

*CORRECTED BY

**ADDITIONS BY

ELEVATION

DEPTH TO ROCK

17 WATER WELL CONTRACTOR'S CERTIFICATION: 1154

This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

REGISTERED BUSINESS NAME ___ REGISTRATION NO. ___

Address ___

Signed ___ AUTHORIZED REPRESENTATIVE Date ___

D67d 100M (Rev. 12-68)

GEOLOGICAL SURVEY COPY

WATER WELL RECORD

ACT 294 PA 1965

MICHIGAN DEPARTMENT OF PUBLIC HEALTH

1 LOCATION OF WELL

County	Township Name	Fraction	Section Number	Town Number	Range Number
[illegible]	[illegible]	SE ¼ SE ¼ SE ¼	27	N/S.	E/W

Distance And Direction from Road Intersection: [illegible]

Street address & City of Well Location

Locate with "X" in section below

(Section grid, 1 MILE, marked with X in the lower right)

[redacted]

3 OWNER OF WELL: [illegible]

Address [illegible]

4 WELL DEPTH: (completed) 97' ft. **Date of Completion** 10-28-80

5 ☒ Cable tool ☐ Rotary ☐ Driven ☐ Dug ☐ Hollow rod ☐ Jetted ☐ Bored ☐ ____

6 USE: ☐ Domestic ☐ Public Supply ☑ Industry ☐ Irrigation ☐ Air Conditioning ☐ Commercial ☐ Test Well ☐ Church

7 CASING: Threaded ☐ Welded ☒

Diam. 4" in. to 97 ft. Depth; ____ in. to ____ ft. Depth

Height: Above/Below Surface ____ ft. Weight ____ lbs./ft. Drive Shoe? Yes ☑ No ☐

2

FORMATION	THICKNESS OF STRATUM	DEPTH TO BOTTOM OF STRATUM
Clay & Sand	30	30'
Sand & Gravel	60	60
Clay	25	85'
Sand	12.	97.

USE A 2ND SHEET IF NEEDED

8 SCREEN: Type Johnson Dia.: 4" Slot/Gauze 10 Length 4' Set between 93 ft. and 97 ft. Fittings: [illegible] K. packer

9 STATIC WATER LEVEL 45 ft. below land surface

10 PUMPING LEVEL below land surface 60' ft. after ____ hrs. pumping 20 g.p.m.; ____ ft. after ____ hrs. pumping ____ g.p.m.

11 WATER QUALITY in Parts Per Million: Iron (Fe) ____ Chlorides (Cl) ____ Hardness ____ Other ____

12 WELL HEAD COMPLETION: ☐ In Approved Pit ☒ Pitless Adapter ☒ 12" Above Grade

13 Well Grouted? ☐ Yes ☐ No ☐ Neat Cement ☐ Bentonite ☐ ____ Depth: From ____ ft. to ____ ft.

14 Nearest Source of possible contamination 100 feet S Direction [illegible] Type

Well disinfected upon completion ☑ Yes ☐ No

15 PUMP: ☐ Not installed

Manufacturer's Name Red Jacket

Model Number 100 w 1 [illegible] HP 1 Volts 220

Length of Drop Pipe 80 ft. capacity 2[illegible] G.P.M.

Type: ☒ Submersible ☐ Jet ☐ Reciprocating

16 Remarks, elevation, source of data, etc.

ADDED INFO BY DRILLER, ITEM NO.
CORRECTED BY
[illegible] BY
[illegible]
[illegible] ROCK

17 WATER WELL CONTRACTOR'S CERTIFICATION:

This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

[illegible] — 1154

REGISTERED BUSINESS NAME — REGISTRATION NO.

Address 940 [illegible]

Signed [signature] Date 11-30-80

AUTHORIZED REPRESENTATIVE

D67d 100M (Rev. 12-68)

GEOLOGICAL SURVEY COPY

2

WATER WELL RECORD

ACT 294 PA 1965

SE SE

MICHIGAN DEPARTMENT OF PUBLIC HEALTH

1 LOCATION OF WELL

County	Township Name	Fraction	Section Number	Town Number	Range Number
Oakland	Highland		21	3 N/S.	7 E/W.

Distance And Direction from Road Intersection:

Street address & City of Well Location:

Locate with "X" in section below — Sketch Map: Highland

(Section grid: N, S, E, W; 1 MI.; 1 MILE)

3 OWNER OF WELL

Address

4 WELL DEPTH: (completed) 96 ft. — Date of Completion 5-23-80

5
- [x] Cable tool
- [ ] Rotary
- [ ] Driven
- [ ] Dug
- [ ] Hollow rod
- [ ] Jetted
- [ ] Bored
- [ ] ______

6 USE:
- [x] Domestic
- [ ] Public Supply
- [ ] Industry
- [ ] Irrigation
- [ ] Air Conditioning
- [ ] Commercial
- [ ] Test Well
- [ ] ______

7 CASING:
Threaded [x] Welded [ ]

Diam. 4" in. to ____ ft. Depth; ____ in. to ____ ft. Depth

Height: Above/Below Surface 1 ft.

Weight 11 lbs./ft.

Drive Shoe? Yes [x] No [ ]

2 FORMATION

FORMATION	THICKNESS OF STRATUM	DEPTH TO BOTTOM OF STRATUM
Sand/Gravel/S clay	36	36
Sand/no water	36	72
Red clay	8	80
Sand/Gravel/W. Plenty	16	96

USE A 2ND SHEET IF NEEDED

8 SCREEN:
Type: Johnson Stainless — Dia.: 4"

Slot/Gauze 12 — Length 4 ft

Set between 92 ft. and 96 ft.

Fittings: K Packer-Plug-Tail pipe

9 STATIC WATER LEVEL
50 ft. below land surface

10 PUMPING LEVEL below land surface
40 ft. after 1 hrs. pumping 35 g.p.m.

40 ft. after 1 hrs. pumping 35 g.p.m.

11 WATER QUALITY in Parts Per Million:
Iron (Fe) ______ Chlorides (Cl) ______

Hardness ______ Other ______

12 WELL HEAD COMPLETION:
- [ ] In Approved Pit
- [x] Pitless Adapter
- [x] 12" Above Grade

13 Well Grouted?
[ ] Yes [ ] No

[ ] Neat Cement [ ] Bentonite [ ] ______

Depth: From ______ ft. to ______ ft.

14 Nearest Source of possible contamination
100 feet S Direction Septic Type

Well disinfected upon completion [x] Yes [ ] No

15 PUMP:
[ ] Not installed

Manufacturer's Name F.&W.

Model Number 11BF9 HP 1 Volts 230

Length of Drop Pipe 74 ft. capacity 19 G.P.M.

Type [x] Submersible [ ] Jet [ ] Reciprocating

16 Remarks, elevation, source of data, etc.

ADDED INFO BY DRILLER, ELEV. NO.
RECORDED BY
... BY
...
... ROCK

d/c

17 WATER WELL CONTRACTOR'S CERTIFICATION:
This well was drilled under my jurisdiction and this report is true to my best of my knowledge and belief.

Paul Zelony Well Drilling — 0311

REGISTERED BUSINESS NAME — REGISTRATION NO.

Address 4794 N. Duck Lk Rd - Highland

Signed Paul Zelony — AUTHORIZED REPRESENTATIVE — Date 5-27-80

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GEOLOGICAL SURVEY COPY

WATER WELL RECORD
ACT 294 PA 1965

MICHIGAN DEPARTMENT OF PUBLIC HEALTH

1 LOCATION OF WELL

County	Twp.	Fraction	Section No	Town	Range
Oakland	Highland	SE. NE. SW.	~~22~~ 15	3 N	7 E

Distance And Direction from Road Intersections

OWNER No.

Street address & City of Well Location: Northwest Elementary School

3 OWNER OF WELL
Milford School District
Address: Milford, Michigan

2 FORMATION	THICKNESS OF STRATUM	DEPTH TO BOTTOM OF STRATUM
Yellow Sand	10'	10'
Gravel and Heavy Stone	15'	25'
Yellow Sand & Clay Mixed	20'	45'
Fine Grey Sand	34'	79'
Med. Fine Sand & Gravel	5'	84'
Fine Water Sand	6'	90'

4 WELL DEPTH: (completed) 90 ft. Date of Completion 7-14-67

5 ☒ Cable tool ☐ Rotary ☐ Driven ☐ Dug ☐ Hollow rod ☐ Jetted ☐ Bored ☐ ___

6 USE ☐ Domestic ☒ Public Supply ☐ Industry ☐ Irrigation ☐ Air Conditioning ☐ Commercial ☐ Test Well ☐ ___

7 CASING: Diam. 6 in. to 80'-3" ft. Depth. Threaded ☒ Welded ☐
Height: Above/Below surface 15" ~~XX~~
Weight 19.45 lbs/ft.
___ in. to ___ ft. Depth
Drive Shoe? Yes ☒ No ☐

8 SCREEN: Johnson ~~XXXX~~ Stainless Steel
Type Top 5'-1" #10 Dia.: 6"
Slot ~~XXXX~~ Bottom 5'-1" #10 Length 10'-2"
Set between 79 ft. and 90 ft.
Fittings: 5" x 17" Nipple

9 STATIC WATER LEVEL
32 ft. below land surface

10 PUMPING LEVEL below land surface
63 ft. after 4 hrs. pumping 167 g.p.m.
___ ft. after ___ hrs. pumping ___ g.p.m.

11 WATER QUALITY in Parts Per Million:
Iron (Fe) 2.5 Chlorides (Cl) ~~XXX~~ 51
Hardness 290.7

12 WELL HEAD COMPLETION: ☐ In Approved Pit ☒ Pitless Adapter ☐ 12" Above Grade

13 GROUTING:
Well Grouted? ☐ Yes ☒ No
Material: ☐ Neat Cement ☐ ___
Depth: From ___ ft. to ___ ft.

14 SANITARY: UNKNOWN
Nearest Source of possible contamination
___ feet ___ Direction ___ Type
Well disinfected upon completion ☒ Yes ☐ No

15 PUMP:
Manufacturer's Name Jacuzzi
Model Number 1056 M4 HP 10
Length of Drop Pipe 62 ft. capacity ~~200~~ G.P.M. 170
Type: ☐ Submersible ☐ ___ ☒ Jet ☐ Reciprocating

elev. 1025 ±5 MSL
St. wel 993 ±5

16 Remarks, elevation, source of data, etc.

ADDED INFO. BY DRILLER, ITEM NO.

CORRECTED BY:

17 WATER WELL CONTRACTOR'S CERTIFICATION:
This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

O. O. Corsaut Inc. — REGISTERED BUSINESS NAME
0025 — REGISTRATION NO.

Address 15101 W. 11 Mile, Oak Park 48237

Signed Owen Corsaut — AUTHORIZED REPRESENTATIVE
Date Oct. 17, 1967

D670 100M 6-66

WATER WELL RECORD

ACT 294 PA 1965

MICHIGAN DEPARTMENT OF PUBLIC HEALTH

1 LOCATION OF WELL

County	Twp.	Fraction	Section No.	Town	Range
OAK	HIGHLAND	SE ¼ SW ¼ SW ¼	22	3 0 S.	7 E W.

Distance And Direction from Road Intersections

Street address & City of Well Location

OWNER No.

3 OWNER OF WELL

Address

2 FORMATION	THICKNESS OF STRATUM	DEPTH TO BOTTOM OF STRATUM
Sand	10	10
Soft sand	20	30
Sand w/b	8	38

4 WELL DEPTH: (completed) 38 ft. **Date of Completion** Feb. 9, 1968

5 ☐ Cable tool ☐ Rotary ☐ Driven ☐ Dug ☒ Hollow rod ☐ Jetted ☐ Bored ☐ ___

6 USE: ☒ Domestic ☐ Public Supply ☐ Industry ☐ Irrigation ☐ Air Conditioning ☐ Commercial ☐ Test Well ☐ ___

7 CASING: Diam. 2 in. to 35½ ft. Depth; Threaded ☒ Welded ☐; ___ in. to ___ ft. Depth

Height: Above/Below surface ___ ft.; Weight 3.75 lbs/ft.; Drive Shoe? Yes ☒ No ☐

8 SCREEN:

Type Wire wound Dia.: 1¼"

Slot/Gauze 10 slot Length 2½'

Set between 35½ ft. and 38 ft.

Fittings: standard

9 STATIC WATER LEVEL

20 ft. below land surface

10 PUMPING LEVEL below land surface

___ ft. after 1 hrs. pumping 15 g.p.m.

___ ft. after ___ hrs. pumping ___ g.p.m.

11 WATER QUALITY in Parts Per Million:

Iron (Fe) ___ Chlorides (Cl) ___

Hardness ___

12 WELL HEAD COMPLETION: ☐ In Approved Pit ☐ Pitless Adapter ☐ 12" Above Grade

13 GROUTING:

Well Grouted? ☐ Yes ☐ No

Material: ☐ Neat Cement ☐ ___

Depth: From ___ ft. to ___ ft.

14 SANITARY:

Nearest Source of possible contamination

75 feet ___ Direction septic tank

Well disinfected upon completion ☒ Yes ☐ No

15 PUMP:

Manufacturer's Name not installed

Model Number ___ HP ___

Length of Drop Pipe ___ ft. capacity ___ G.P.M.

Type: ☐ Submersible ☐ ___ ☐ Jet ☐ Reciprocating

By others →

16 Remarks, elevation, source of data, etc.

17 WATER WELL CONTRACTOR'S CERTIFICATION:

This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

Brown Drilling Co. (REGISTERED BUSINESS NAME) 26 (REGISTRATION NO.)

Address 7215 Highland Rd.- Howell, Mich.

Signed ___ (AUTHORIZED REPRESENTATIVE) Date Dec 67

D670 100M 6-66 APR 17 1968

2 JUL 29 1975

WATER WELL RECORD

ACT 294 PA 1965

MICHIGAN DEPARTMENT OF PUBLIC HEALTH

1 LOCATION OF WELL

County	Township Name	Fraction	Section Number	Town Number	Range Number
Oakland	HIGHLAND	¼ ¼ NE ¼	22	3 N/S.	7 E/W.

Distance And Direction from Road Intersections

Street address & City of Well Location

Locate with "X" in section below — Sketch Map: [redacted]

(N / W / E / S — 1 MI. — 1 MILE)

2 FORMATION

FORMATION	THICKNESS OF STRATUM	DEPTH TO BOTTOM OF STRATUM
0–24½' [illegible]	24	24½
24–80 [illegible] & [illegible] SAND	56	80
80–890 SAND & FINE SAND	10	890
50–58 GRAVEL	8	58

USE A 2ND SHEET IF NEEDED

3 OWNER OF WELL: [illegible]

Address [illegible]

4 WELL DEPTH: (completed) 58 ft. Date of Completion 3-7-75

5 ☐ Cable tool ☐ Rotary ☐ Driven ☐ Dug ☒ Hollow rod ☐ Jetted ☐ Bored ☐ ____

6 USE: ☒ Domestic ☐ Public Supply ☐ Industry ☐ Irrigation ☐ Air Conditioning ☐ Commercial ☐ Test Well ☐

7 CASING: Threaded ☐ Welded ☐ Height: Above Surface 1 ft.

Diam. 2 in. to 55 ft. Depth; 1¼ in. to ____ ft. Depth. Weight ____ lbs./ft. Drive Shoe? Yes ☐ No ☐

8 SCREEN: Type: Johnson Dia.: 1¼ Slot ____ Length 3' Set between 55 ft. and 58 ft. Fittings: [illegible]

9 STATIC WATER LEVEL 20 ft. below land surface

10 PUMPING LEVEL below land surface 30 ft. after 1 hrs. pumping 15 g.p.m.; ____ ft. after ____ hrs. pumping ____ g.p.m.

11 WATER QUALITY in Parts Per Million: Iron (Fe) ____ Chlorides (Cl) ____ Hardness ____ Other ____

12 WELL HEAD COMPLETION: ☐ In Approved Pit ☒ Pitless Adapter ☐ 12" Above Grade

13 Well Grouted? ☐ Yes ☐ No ☐ Neat Cement ☐ Bentonite ☒ [illegible] Depth: From ____ ft. to ____ ft.

14 Nearest Source of possible contamination 50 feet [illegible] Direction SEPTIC Type. Well disinfected upon completion ☐ Yes ☐ No

15 PUMP: ☐ Not installed. Manufacturer's Name ____ Model Number ____ HP ____ Volts ____ Length of Drop Pipe ____ ft. capacity ____ G.P.M. Type: ☐ Submersible ☐ Jet ☐ Reciprocating

16 Remarks, elevation, source of data, etc.

ADDED INFO BY DRILLER. *CORRECTED BY **ADDITION BY KFL ELEVATION DEPTH TO ROCK

17 WATER WELL CONTRACTOR'S CERTIFICATION:

This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

[signature] 0644066

ITEM REGISTERED BUSINESS NAME — REGISTRATION NO.

Address Box 6 S [illegible]

Signed [signature] AUTHORIZED REPRESENTATIVE Date 1-5-3-22-75

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JUL 29 1975

(27)

WATER WELL RECORD
ACT 294 PA 1965

MICHIGAN DEPARTMENT OF PUBLIC HEALTH

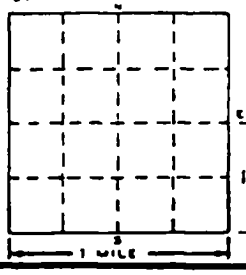
1 LOCATION OF WELL

County	Township Name	Fraction	Section Number	Town Number	Range Number
OAKLAND	HIGHLAND	NE¼ NE¼ NE¼	22	3 N	7 E/W

Distance And Direction from Road Intersections

Street Address & City of Well Location

Locate with "X" in section below — Sketch MAP:



3 OWNER OF WELL: [redacted]

Address [redacted]

4 WELL DEPTH: (completed) 58 ft. — **Date of Completion** 5-11-75

5 ☐ Cable tool ☐ Rotary ☐ Driven ☐ Dug ☑ Hollow rod ☐ Jetted ☐ Bored ☐ ____

6 USE: ☑ Domestic ☐ Public Supply ☐ Industry ☐ Irrigation ☐ Air Conditioning ☐ Commercial ☐ Test Well ☐

7 CASING: Threaded ☐ Welded ☐ — Height: Above/Below Surface 1 ft.

2 in. Diam. to 55 ft. Depth — Weight 4 lbs./ft.

~~2½~~ in. to 58 ft. Depth — Drive Shoe? yes ☐ no ☑

2 FORMATION	THICKNESS OF STRATUM	DEPTH TO BOTTOM OF STRATUM
0-25 RED GRAVEL	25	25
25-45 CLAY & GRAVEL	20	45
45-50 CLAY & SAND	5	50
50-58 GRAVEL	8	58

8 SCREEN:

Type: JOHNSON Dia.: 1¼

Slot/Gauge ____ Length 3'

Set between 55 ft. and 58 ft.

Fittings: CHECK VALVE

9 STATIC WATER LEVEL

24 ft. below land surface

10 PUMPING LEVEL below land surface

30 ft. after 1 hrs. pumping 15 G.P.M.

____ ft. after ____ hrs. pumping ____ G.P.M.

11 WATER QUALITY in Parts Per Million:

Iron (Fe) ____ Chlorides (Cl) ____

Hardness ____ Other ____

12 WELL HEAD COMPLETION: ☐ In Approved Pit ☑ Pitless Adapter ☐ 12" Above Grade

13 Well Grouted? ☐ Yes ☐ No ☐ Neat Cement ☐ Bentonite ☐ Puddle clay

Depth: From ____ ft. to ____ ft.

14 Nearest Source of possible contamination

60 feet S Direction SEPTIC Type

Well disinfected upon completion ☐ Yes ☐ No

15 PUMP: ☐ Not installed

Manufacturer's Name ____

Model Number ____ HP ____ Volts ____

Length of Drop Pipe ____ ft. capacity ____ G.P.M.

Type: ☐ Submersible ☐ Jet ☐ Reciprocating

USE A 2ND SHEET IF NEEDED

16 Remarks, elevation, source of data, etc.

ADDED INFO BY DRILLER, ITEM NO.

*CORRECTED BY

**ADDITION BY

ELEVATION

DEPTH TO ROCK

17 WATER WELL CONTRACTOR'S CERTIFICATION:

This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

D. K. Jones Jr. — REGISTERED BUSINESS NAME

0406 — REGISTRATION NO.

Address: Box 67 Highland Mich.

Signed ____ AUTHORIZED REPRESENTATIVE — Date ____

D67d 100M (Rev. 12-68)

JUL 29 1975

WATER WELL RECORD

ACT 294 PA 1965

MICHIGAN DEPARTMENT OF PUBLIC HEALTH

1 LOCATION OF WELL

County	Township Name	Fraction	Section Number	Town Number	Range Number
OAK	HIGHLAND	NE	22	3 N	7 E/W.

Distance And Direction from Road Intersections: –

Street address & City of Well Location

Locate with "X" in section below — Sketch Map: [redacted]

(1 MILE) (1 MI.)

3 OWNER OF WELL:

Address

4 WELL DEPTH: (completed) 58 ft. Date of Completion 3-1-75

5 ☐ Cable tool ☐ Rotary ☐ Driven ☐ Dug
☒ Hollow rod ☐ Jetted ☐ Bored ☐ ____

6 USE: ☒ Domestic ☐ Public Supply ☐ Industry
☐ Irrigation ☐ Air Conditioning ☐ Commercial
☐ Test Well ☐ ____

7 CASING: Threaded ☐ Welded ☐ Height: Above/~~Below~~ Surface 1 ft.
Diam. 2 in. to 58 ft. Depth; 2 in. to 58 ft. Depth
Weight 4 lbs./ft.
Drive Shoe? Yes ☐ No ☐

2 FORMATION	THICKNESS OF STRATUM	DEPTH TO BOTTOM OF STRATUM
0 - 18 RED SAND	18	18
18 - 30 SAND + CLAY	12	30
30 - 45 SAND (FINE)	15	45
45 - 52 CLAY	7	52
52 - 58 GRAVEL	6	58
USE A 2nd SHEET IF NEEDED		

8 SCREEN:
Type: JOHNSON Dia.: 1 1/4
Slot/~~Gauge~~ Length 3'
Set between 55 ft. and 58 ft.
Fittings: CHECK VALVE

9 STATIC WATER LEVEL
____ ft. below land surface

10 PUMPING LEVEL below land surface
?22 ft. after ___ hrs. pumping ____ g.p.m.
____ ft. after ___ hrs. pumping ____ g.p.m.

11 WATER QUALITY in Parts Per Million:
Iron (Fe) ____ Chlorides (Cl) ____
Hardness ____ Other ____

12 WELL HEAD COMPLETION: ☐ In Approved Pit
☒ Pitless Adapter ☐ 12" Above Grade

13 Well Grouted? ☐ Yes ☐ No
☐ Neat Cement ☐ Bentonite ☐ Pipe drive
Depth: From ____ ft. to ____ ft.

14 Nearest Source of possible contamination
60 feet N Direction SPETIC Type
Well disinfected upon completion ☒ Yes ☐ No

15 PUMP: ☐ Not installed
Manufacturer's Name ____
Model Number ____ HP ____ Volts ____
Length of Drop Pipe ____ ft. capacity ____ G.P.M.
Type: ☐ Submersible
☐ Jet ☐ Reciprocating

JUL 23 1975

16 Remarks, elevation, source of data, etc.

*NO INFO BY DRILLER, ITEM NO.
*CORRECTED BY
**ADDITION BY
ELEVATION
DEPTH TO ROCK

17 WATER WELL CONTRACTOR'S CERTIFICATION:
This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

B.R. [signature] 646 — REGISTERED BUSINESS NAME / REGISTRATION NO.

Address Box 15 [illegible]

Signed [signature] AUTHORIZED REPRESENTATIVE Date 6 5 75

D67d 100M (Rev. 12-68)

GEOLOGICAL SURVEY COPY

2 JUL 29 1975

WATER WELL RECORD
ACT 294 PA 1965

MICHIGAN DEPARTMENT OF PUBLIC HEALTH

1 LOCATION OF WELL

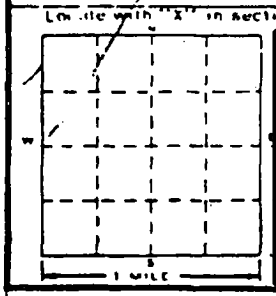
County	Township Name	Fraction	Section Number	Town Number	Range Number
OAKLAND	HIGHLAND	NW. NE. NE.	22	3 N/S.	7 E/W.

Distance And Direction from Road Intersections

Street Address & City of Well Location

Locate with "X" in section below

Sketch Map:



3 OWNER OF WELL

Address

4 WELL DEPTH: (completed) 54 ft. **Date of Completion** 3-17-75

5 ☐ Cable tool ☐ Rotary ☐ Driven ☐ Dug
☒ Hollow rod ☐ Jetted ☐ Bored ☐ ____

6 USE: ☒ Domestic ☐ Public Supply ☐ Industry
☐ Irrigation ☐ Air Conditioning ☐ Commercial
☐ Test Well ☐

7 CASING: Threaded ☐ Welded ☐ Height: Above/Below
Diam. 2 in. to 55 ft. Depth — Surface 1 ft.
1¼ in. to 54 ft. Depth — Weight 4 lbs./ft.
Drive Shoe? Yes ☐ No ☐

2 FORMATION	THICKNESS OF STRATUM	DEPTH TO BOTTOM OF STRATUM
0-25 RED GRAVEL	25	25
25-45 CLAY & GRAVEL	20	45
45-50 CLAY & GRAVEL	5	50
50-58 GRAVEL	8	58

8 SCREEN:
Type: JOHNSON Dia.: 1¼
Slot/Gauze ____ Length 3
Set between 55 ft. and 58 ft.
Fittings: CHECK VALVE

9 STATIC WATER LEVEL
24 ft. below land surface

10 PUMPING LEVEL below land surface
30 ft. after 1 hrs. pumping 15 g.p.m.
____ ft. after ____ hrs. pumping ____ g.p.m.

11 WATER QUALITY in Parts Per Million:
Iron (Fe) ____ Chlorides (Cl) ____
Hardness ____ Other ____

12 WELL HEAD COMPLETION: ☐ In Approved Pit
☐ Pitless Adapter ☐ 12" Above Grade

13 Well Grouted? ☐ Yes ☒ No
☐ Neat Cement ☐ Bentonite ☐ Cement
Depth: From [redacted] ft. to [redacted] ft.

14 Nearest Source of possible contamination
60 feet S Direction SEPTIC Type
Well disinfected upon completion ☒ Yes ☐ No

15 PUMP: ☐ Not installed
Manufacturer's Name ____
Model Number ____ HP ____ Volts ____
Length of Drop Pipe ____ ft. capacity ____ G.P.M.
Type: ☐ Submersible ☐ Jet ☐ Reciprocating

JUL 29 1975
USE A 2ND SHEET IF NEEDED

16 Remarks, elevation, source of data, etc.

RECEIVED BY DRILLER, ITEM NO.
CORRECTED BY
ADDITION BY
ELEVATION PEK
DEPTH TO ROCK

17 WATER WELL CONTRACTOR'S CERTIFICATION:
This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

[redacted] Harbor 0466
REGISTERED BUSINESS NAME REGISTRATION NO.

Address Box 65 Presque Isle Harbor

Signed [redacted] Date 6-1-75
AUTHORIZED REPRESENTATIVE

D67d 100M (Rev. 12-68)

WATER WELL RECORD

ACT 294 PA 1965

MICHIGAN DEPARTMENT OF PUBLIC HEALTH

JUL ... 1972

1 LOCATION OF WELL

County	Township Name	Fraction	Section Number	Town Number	Range Number
OAKLAND	HIGHLAND	NE ¼ ¼ ¼	21	3 N/S.	7 E/W.

Distance And Direction from Road Intersections

Street address & City of Well Location: Lot #60

Locate with "X" in section below — 1 MILE

Sketch Map: [redacted]

2 FORMATION

FORMATION	THICKNESS OF STRATUM	DEPTH TO BOTTOM OF STRATUM
Sand, some clay and stones	35'	35'
Water bearing sand	9'	44'
[illegible handwriting]		

USE A 2ND SHEET IF NEEDED

3 OWNER OF WELL:

Address:

4 WELL DEPTH: (completed) 44 ft. Date of Completion: June, 1972

5 ☐ Cable tool ☐ Rotary ☐ Driven ☐ Dug ☐ Hollow rod ☒ Jetted ☐ Bored ☐

6 USE: ☒ Domestic ☐ Public Supply ☐ Industry ☐ Irrigation ☐ Air Conditioning ☐ Commercial ☐ Test Well ☐

7 CASING: Threaded ☒ Welded ☐ Diam. 2 in. to 41 ft. Depth; ___ in. to ___ ft. Depth
Height: Above/~~Below~~ Surface 1 ft. Weight 3.75 lbs./ft. Drive Shoe? Yes ☒ No ☐

8 SCREEN: Johnson
Type: Red Head Dia.: 1¼"
Slot/~~Gauze~~ 10 Length 3'
Set between 41 ft. and 44 ft.
Fittings: 2 Couplings, 1 Nipple

9 STATIC WATER LEVEL 20 ft. below land surface

10 PUMPING LEVEL below land surface
25 ft. after ___ hrs. pumping 10 g.p.m.
___ ft. after ___ hrs. pumping ___ g.p.m.

11 WATER QUALITY in Parts Per Million:
Iron (Fe) ___ Chlorides (Cl) ___
Hardness ___ Other ___

12 WELL HEAD COMPLETION: ☐ In Approved Pit ☒ Pitless Adapter ☐ 12" Above Grade

13 Well Grouted? ☐ Yes ☒ No
☐ Neat Cement ☐ Bentonite ☐
Depth: From ___ ft. to ___ ft.

14 Nearest Source of possible contamination
50 feet Direction ___ Septic Type
Well disinfected upon completion ☒ Yes ☐ No

15 PUMP: ☐ Not installed
Manufacturer's Name: Sta-Rite
Model Number: SSJC HP ½ Volts 230
Length of Drop Pipe 21 ft. capacity 10 G.P.M.
Type: ☐ Submersible ☒ Jet ☐ Reciprocating

16 Remarks, elevation, source of data, etc.

ADDED INFO. BY DRILLER ...

CORRECTED BY:

ADDITION BY:

17 WATER WELL CONTRACTOR'S CERTIFICATION:
This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

James N. Layman — REGISTERED BUSINESS NAME; 0645 — REGISTRATION NO.

Address: 10275 Eagle Rd., Davisburg

Signed: James N Layman (AUTHORIZED REPRESENTATIVE) Date 6/20/72

D67d 100M (Rev. 12-68)

(2-1)

WATER WELL RECORD
ACT 294 PA 1965

MICHIGAN DEPARTMENT OF PUBLIC HEALTH

1 LOCATION OF WELL

County	Township Name	Fraction	Section Number	Town Number	Range Number
Oakland	Highland	SE SW SW	21	3 N/	7 E/

Distance And Direction from Road Intersections

Street address & City of Well Location

Locate with "X" in section below — Sketch Map:

N / W / E / 1 MI. / 1 MILE

3 OWNER OF WELL: Hi Mill MFG. Co.
Address 1704 M-59 Highland

4 WELL DEPTH: (completed) 50 ft. Date of Completion 1-15-69

5 ☒ Cable tool ☐ Rotary ☐ Driven ☐ Dug ☐ Hollow rod ☐ Jetted ☐ Bored ☐ ____

6 USE: ☐ Domestic ☐ Public Supply ☐ Industry ☐ Irrigation ☐ Air Conditioning ☒ Commercial ☐ Test Well ☐ ____

7 CASING: Threaded ☒ Welded ☐ Diam. 6
6 in. to 45 ft. Depth
____ in. to ____ ft. Depth
Height: Above/Below Surface ____ ft.
Weight ____ lbs./ft.
Drive Shoe? Yes ☒ No ☐

8 SCREEN: Johnson stainless steel
Type: W/W Dia.: 6"
Slot/Gauze 50 Length 5'
Set between 45 ft. and 50 ft.
Fittings: STANDARD

9 STATIC WATER LEVEL
9 ft. below land surface

10 PUMPING LEVEL below land surface
____ ft. after ____ hrs. pumping ____ g.p.m.
____ ft. after ____ hrs. pumping ____ g.p.m.

11 WATER QUALITY in Parts Per Million:
Iron (Fe) ____ Chlorides (Cl) ____
Hardness ____ Other ____

12 WELL HEAD COMPLETION: ☐ In Approved Pit ☒ Pitless Adapter ☐ 12" Above Grade

13 Well Grouted? ☐ Yes ☐ No
☐ Neat Cement ☐ Bentonite ☐ ____
Depth: From ____ ft. to ____ ft.

14 Nearest Source of possible contamination
50 feet ____ Direction ____ Septic Type
Well disinfected upon completion ☒ Yes ☐ No

15 PUMP: ☐ Not installed
Manufacturer's Name Red Jacket
Model Number 8DC200T4 HP 2 Volts ____
Length of Drop Pipe 36 ft. capacity ____ G.P.M.
Type: ☒ Submersible ☐ Jet ☐ Reciprocating

2 FORMATION

FORMATION	THICKNESS OF STRATUM	DEPTH TO BOTTOM OF STRATUM
Red Clay	10	10
Blue Clay	26	36
Gravel	14	50

USE A 2ND SHEET IF NEEDED

16 Remarks, elevation, source of data, etc.

Rev 5-1-1335

ADDITION BY

17 WATER WELL CONTRACTOR'S CERTIFICATION:
This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.
Brown Drilling Co. Inc — 26
REGISTERED BUSINESS NAME — REGISTRATION NO.
Address 2215 M-59 - Howell, Mich
Signed Harry K. Brown Sr. Date 11-6-70
AUTHORIZED REPRESENTATIVE

D67d 100M (Rev. 12-68)

SEP 04 1979

WATER WELL RECORD

ACT 294 PA 1965

MICHIGAN DEPARTMENT OF PUBLIC HEALTH

1 LOCATION OF WELL

County	Township Name	Fraction	Section Number	Town Number	Range Number
Oakland	Highland	SW SW SE	21	3 N/S	7 E/W

Distance And Direction from Road Intersections

Street address & City of Well Location

Locate with "X" in section below — Sketch Map:

[redacted]

3 OWNER OF WELL:

Address

4 WELL DEPTH: (completed) 68' ft. 4-14-79

5 ☒ Cable tool ☐ Rotary ☐ Driven ☐ Dug ☐ Hollow rod ☐ Jetted ☐ Bored ☐

6 USE: ☒ Domestic ☐ Public Supply ☐ Industry ☐ Irrigation ☐ Air Conditioning ☐ Commercial ☐ Test Well ☐

7 CASING: Threaded ☐ Welded ☒ Diam.
4 in. to 68 ft. Depth
in. to ft. Depth
Height: Above/Below Surface ___ ft.
Weight ___ lbs./ft.
Drive Shoe? Yes ☒ No ☐

2 FORMATION	THICKNESS OF STRATUM	DEPTH TO BOTTOM OF STRATUM
Clay & Gravel		50
Sand		60
Sand & Gravel		68.

USE A 2ND SHEET IF NEEDED

8 SCREEN:
Type Johnson Dia.: 4"
Slot/Gauge 12 Length 4'
Set between 64 ft. and 68 ft.
Fittings:

9 STATIC WATER LEVEL
30' ft. below land surface

10 PUMPING LEVEL below land surface
50' ft. after 1 hrs. pumping 25+ g.p.m.
___ ft. after ___ hrs. pumping ___ g.p.m.

11 WATER QUALITY in Parts Per Million:
Iron (Fe) ___ Chlorides (Cl) ___
Hardness ___ Other ___

12 WELL HEAD COMPLETION: ☐ In Approved Pit ☒ Pitless Adapter ☒ 12" Above Grade

13 Well Grouted? ☐ Yes ☐ No
☐ Neat Cement ☐ Bentonite ☐
Depth: From ___ ft. to ___ ft.

14 Nearest Source of possible contamination
75 feet 6 Direction Septic Type
Well disinfected upon completion ☐ Yes ☐ No

15 PUMP: ☐ Not installed
Manufacturer's Name Red Jacket
Model Number 9BC-2 HP 1/2 Volts 220
Length of Drop Pipe 20' ft. capacity 10 G.P.M.
Type: ☒ Submersible ☐ Jet ☐ Reciprocating

AUG 21 1979

16 Remarks, elevation, source of data, etc.

ACCES INFO BY DRILLER, ITEM NO.
*CORRECTED BY
**ADDITION BY [initials]
ELEVATION
DEPTH TO ROCK

17 WATER WELL CONTRACTOR'S CERTIFICATION:
This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

Ernest Morris W.D. Inc. 1154
REGISTERED BUSINESS NAME — REGISTRATION NO.

Address 840 N. Milford

Signed [signature] Date 4-14-79
AUTHORIZED REPRESENTATIVE

D67d 1009 (Rev. 12-58)

GEOLOGICAL SURVEY COPY

WATER WELL RECORD
ACT 294 PA 1965

MICHIGAN DEPARTMENT OF PUBLIC HEALTH

1 LOCATION OF WELL

County	Township Name	Fraction	Section Number	Town Number	Range Number
Oakland	Highland	SE ¼ SE ¼ NE ¼	14	3 N	7 E/W

Distance And Direction from Road Intersections:

Street address & City of Well Location

Locate with "X" in section below — Sketch Map: [redacted]

1 MILE

3 OWNER OF WELL: Raglin Const Co

Address: Milford

4 WELL DEPTH: (completed) 32 ft. **Date of Completion:** 2-20-71

5 ☐ Cable tool ☐ Rotary ☐ Driven ☐ Dug ☒ Hollow rod ☐ Jetted ☐ Bored ☐ ____

6 USE: ☒ Domestic ☐ Public Supply ☐ Industry ☐ Irrigation ☐ Air Conditioning ☐ Commercial ☐ Test Well ☐ ____

7 CASING: Threaded ☒ Welded ☐ Diam. 2 in. to 26 ft. Depth; ____ in. to ____ ft. Depth

Height: Above/Below Surface 1 ft. Weight ____ lbs./ft. Drive Shoe? Yes ☒ No ☐

2 FORMATION	THICKNESS OF STRATUM	DEPTH TO BOTTOM OF STRATUM
UNKNOWN		11
Sand + Gravel	9	20
yellow clay + Gravel	2½	22½
Gravel	3½	26
water Bearing Sand	6	32

USE A 2ND SHEET IF NEEDED

8 SCREEN: Type: Clayton Mark Dia.: 1¼

Slot/Gauze 60 Length 4

Set between 28 ft. and 32 ft.

Fittings: 20' Blank Check valve

9 STATIC WATER LEVEL: 11 ft. below land surface

10 PUMPING LEVEL below land surface: 11 ft. after 1 hrs. pumping 17 g.p.m.

____ ft. after ____ hrs. pumping ____ g.p.m.

11 WATER QUALITY in Parts Per Million: Iron (Fe) ____ Chlorides (Cl) ____ Hardness ____ Other ____

12 WELL HEAD COMPLETION: ☐ In Approved Pit ☒ Pitless Adapter ☐ 12" Above Grade

13 Well Grouted? ☐ Yes ☐ No ☐ Neat Cement ☐ Bentonite ☐ ____ Depth: From ____ ft. to ____ ft.

14 Nearest Source of possible contamination: 52 feet N Direction Septic Type

Well disinfected upon completion ☒ Yes ☐ No

15 PUMP: ☒ Not installed

Manufacturer's Name ____

Model Number ____ HP ____ Volts ____

Length of Drop Pipe ____ ft. capacity ____ G.P.M.

Type: ☐ Submersible ☐ Jet ☐ Reciprocating

16 Remarks, elevation, source of data, etc.

ADDED INFO. BY DRILLER, ITEM #8

CORRECTED BY:

CONDITION BY:

17 WATER WELL CONTRACTOR'S CERTIFICATION:

This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

Ronald E Weatherly — REGISTERED BUSINESS NAME — 0794 — REGISTRATION NO.

Address 3945 VAN STONE Dr

Signed Ronald E Weatherly — AUTHORIZED REPRESENTATIVE — Date 2-24-71

D67d 100M (Rev. 12-68)

GEOLOGICAL SURVEY COPY

FEB 16 .. '73

WATER WELL RECORD

ACT 294 PA 1965

MICHIGAN DEPARTMENT OF PUBLIC HEALTH

1 LOCATION OF WELL

County	Township Name	Fraction	Section Number	Town Number	Range Number
Oakland	Highland Twp	SW	14	3 N	7 E

Distance And Direction from Road Intersection

Street address & City of Well Location

Locate with "X" in section below

Sketch Map:

1 MILE

3 OWNER OF WELL: Dennoyelles Builders

Address 3881 Highland Rd Pontiac Mich

4 WELL DEPTH: (completed) 52' ft. Date of Completion 8/71

5 ☐ Cable tool ☐ Rotary ☐ Driven ☐ Dug ☒ Hollow rod ☐ Jetted ☐ Bored ☐

6 USE: ☒ Domestic ☐ Public Supply ☐ Industry ☐ Irrigation ☐ Air Conditioning ☐ Commercial ☐ Test Well ☐

7 CASING: Threaded ☒ Welded ☐ Diam. 2" in. to ___ ft. Depth ___ in. to ___ ft. Depth

Height: Above/Below Surface ___ ft. Weight ___ lbs./ft. Drive Shoe? Yes ☒ No ☐

2 FORMATION	THICKNESS OF STRATUM	DEPTH TO BOTTOM OF STRATUM
Drift		31
Blue Clay	11'	42
Sand	~~10~~ 10	52
elev. 1030 ± 10		
St. w. el. 1000 ± 10		

USE A 2ND SHEET IF NEEDED

8 SCREEN: Type: Johnson Dia.: 1 1/4" Slot/Gauze 10 Length ___ Set between 48 ft. and 52 ft. Fittings: Dresser Chuck

9 STATIC WATER LEVEL 30' ft. below land surface

10 PUMPING LEVEL below land surface

___ ft. after ___ hrs. pumping ___ g.p.m.

___ ft. after ___ hrs. pumping ___ g.p.m.

11 WATER QUALITY in Parts Per Million: Iron (Fe) ___ Chlorides (Cl) ___ Hardness ___ Other ___

12 WELL HEAD COMPLETION: ☐ In Approved Pit ☐ Pitless Adapter ☒ 12" Above Grade

13 Well Grouted? ☐ Yes ☒ No ☐ Neat Cement ☐ Bentonite ☐ Depth: From ___ ft. to ___ ft.

14 Nearest Source of possible contamination 50' feet ___ Direction Septic Type

Well disinfected upon completion ☒ Yes ☐ No

15 PUMP: ☐ Not installed

Manufacturer's Name ___

Model Number ___ HP ___ Volts ___

Length of Drop Pipe ___ ft. capacity ___ G.P.M.

Type ☐ Submersible ☒ Jet ☐ Reciprocating

16 Remarks, elevation, source of data, etc.

ADDED INFO. BY DRILLING DEPT.

CORRECTED BY:

ADDITION BY:

17 WATER WELL CONTRACTOR'S CERTIFICATION:

This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

Ward S. Dean 06-8

REGISTERED BUSINESS NAME REGISTRATION NO.

Address 6253 Clarkston Clarkston

Signed R Ward Date 9/71

AUTHORIZED REPRESENTATIVE

D67d 100M (Rev. 12-68)

WATER WELL RECORD

ACT 294 PA 1965

MICHIGAN DEPARTMENT OF PUBLIC HEALTH

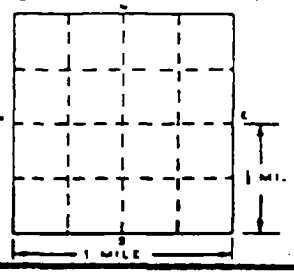
1 LOCATION OF WELL

County	Township Name	Fraction	Section Number	Town Number	Range Number
Oakland	Highland		14	3 N.	7 E.

Distance And Direction from Road Intersections

Street address & City of Well Location

Locate with "X" in section below — Sketch Map:



3 OWNER OF WELL

Address: Beauty Craft Inc.
2294 Williams Lk. Rd.
Pontiac, Mich.

4 WELL DEPTH (completed) 68 ft. **Date of Completion** 1/20/71

5 ☐ Cable tool ☐ Rotary ☐ Driven ☐ Dug ☐ Hollow rod ☒ Jetted ☐ Bored ☐ ____

6 USE: ☒ Domestic ☐ Public Supply ☐ Industry ☐ Irrigation ☐ Air Conditioning ☐ Commercial ☐ Test Well ☐ ____

7 CASING: Threaded ☒ Welded ☐ Diam. 2 in. to 65 ft. Depth; ____ in. to ____ ft. Depth
Height: Above/Below Surface 1 ft. Weight ____ lbs./ft. Drive Shoe? yes ☒ no ☐

2 FORMATION	THICKNESS OF STRATUM	DEPTH TO BOTTOM OF STRATUM
Sand Clay	22	
Clay	25	47
Yellow gravel	10	57
Blue clay	7	64
Water sand	4	68
USE A 2ND SHEET IF NEEDED		

8 SCREEN: Type: slot Dia.: 1¼
Slot/Gauze 7 Length 3
Set between 65 ft. and 68 ft.
Fittings: Breamer valve

9 STATIC WATER LEVEL 35 ft. below land surface

10 PUMPING LEVEL below land surface
55 ft. after 1 hrs. pumping 14 G.P.M.
____ ft. after ____ hrs. pumping ____ G.P.M.

11 WATER QUALITY in Parts Per Million:
Iron (Fe) ____ Chlorides (Cl) ____
Hardness ____ Other ____

12 WELL HEAD COMPLETION: ☐ In Approved Pit ☒ Pitless Adapter ☐ 12" Above Grade

13 Well Grouted? ☐ Yes ☒ No
☐ Neat Cement ☐ Bentonite ☐ ____
Depth: From ____ ft. to ____ ft.

14 Nearest Source of possible contamination
50 feet W Direction septic Type
Well disinfected upon completion ☒ Yes ☐ No

15 PUMP: ☐ Not installed
Manufacturer's Name Myers
Model Number HD50DT26 HP ½ Volts 110
Length of Drop Pipe 42 ft. capacity 18 G.P.M.
Type: ☐ Submersible ☒ Jet ☐ Reciprocating

16 Remarks, elevation, source of data, etc.

17 WATER WELL CONTRACTOR'S CERTIFICATION:
This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

Ray LaLonne Well Drilling — 0140
REGISTERED BUSINESS NAME — REGISTRATION NO

Address 1055 Wyman Pontiac, Mich.

Signed ____ (AUTHORIZED REPRESENTATIVE) Date 4/15/71

D67d 100M (Rev. 12-68)

WATER WELL RECORD

ACT 294 PA 1965.

MICHIGAN DEPARTMENT OF PUBLIC HEALTH

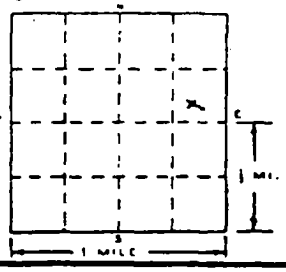
1 LOCATION OF WELL

County	Township Name	Fraction	Section Number	Town Number	Range Number
Oakland	Highland	SE¼ SE¼ NE¼	14	3 N/S.	7 E/W.

Distance And Direction from Road Intersections

Street address & City of Well Location

Locate with "X" in section below



Sketch Map:

3 OWNER OF WELL: Raglin Cost Co

Address Elizabeth Lake Rd Milford,

4 WELL DEPTH: (completed) 32 ft. Date of Completion 3-18-71

5 ☐ Cable tool ☐ Rotary ☐ Driven ☐ Dug ☒ Hollow rod ☐ Jetted ☐ Bored ☐ ____

6 USE: ☒ Domestic ☐ Public Supply ☐ Industry ☐ Irrigation ☐ Air Conditioning ☐ Commercial ☐ Test Well ☐ ____

7 CASING: Threaded ☒ Welded ☐ Diam. 2 in. to 26 ft. Depth; ____ in. to ____ ft. Depth. Height: Above/Below Surface 1 ft. Weight ____ lbs./ft. Drive Shoe? Yes ☒ No ☐

2 FORMATION	THICKNESS OF STRATUM	DEPTH TO BOTTOM OF STRATUM
UNKNOWN		21
Yellow clay	3	24
Hard Pan	2	26
water Bearing Sand		32

USE A 2ND SHEET IF NEEDED

8 SCREEN: Type: Clayton Mark Dia.: 1¼ Slot/Gauze 60 Length 4 Set between 28 ft. and 32 ft. Fittings: 20" Blank check valve

9 STATIC WATER LEVEL 12 ft. below land surface

10 PUMPING LEVEL below land surface 12 ft. after 1 hrs. pumping 13 g.p.m.; ____ ft. after ____ hrs. pumping ____ g.p.m.

11 WATER QUALITY in Parts Per Million: Iron (Fe) ____ Chlorides (Cl) ____ Hardness ____ Other ____

12 WELL HEAD COMPLETION: ☐ In Approved Pit ☒ Pitless Adapter ☐ 12" Above Grade

13 Well Grouted? ☐ Yes ☒ No ☐ Neat Cement ☐ Bentonite ☐ ____ Depth: From ____ ft. to ____ ft.

14 Nearest Source of possible contamination 53 feet N Direction Septic Type. Well disinfected upon complet on ☒ Yes ☐ No

15 PUMP: ☐ Not installed. Manufacturer's Name Meyers. Model Number HC HP ½ Volts 110. Length of Drop Pipe 12 ft. capacity 8 G.P.M. Type: ☐ Submersible ☒ Jet ☐ Reciprocating

16 Remarks, elevation, source of data, etc.

17 WATER WELL CONTRACTOR'S CERTIFICATION:

This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

Ronald E Weatherly — REGISTERED BUSINESS NAME — 079-1 REGISTRATION NO.

Address 3945 N Van Stone Milford

Signed Ronald E Weatherly — AUTHORIZED REPRESENTATIVE — Date 4-5-71

D67d (Rev. 12-65)

WATER WELL RECORD

ACT 294 PA 1965

MICHIGAN DEPARTMENT OF PUBLIC HEALTH

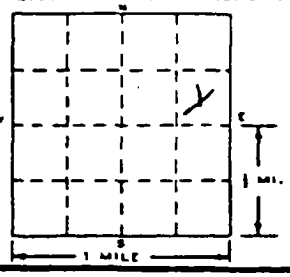
1 LOCATION OF WELL

County	Township Name	Fraction	Section Number	Town Number	Range Number
Oakland	Highland	¼ ¼ ¼	11	3 N/S	7 E/W

Distance And Direction from Road Intersections

Street address & City of Well Location N/A

Locate with "X" in section below. Sketch Map:



3 OWNER OF WELL: /

Address /

4 WELL DEPTH: (completed) 46' ft. Date of Completion July, 1982

5 ☐ Cable tool ☒ Rotary ☐ Driven ☐ Dug ☐ Hollow rod ☐ Jetted ☐ Bored ☐ ____

6 USE: ☒ Domestic ☐ Public Supply ☐ Industry ☐ Irrigation ☐ Air Conditioning ☐ Commercial ☐ Test Well ☐

7 CASING: Threaded ☐ Welded ☒ Height: Above/Below Surface 1 ft.

Diam. 8" in. to 42' ft. Depth; ____ in. to ____ ft. Depth

Weight ____ lbs./ft. Drive Shoe? Yes ☒ No ☐

2 FORMATION	THICKNESS OF STRATUM	DEPTH TO BOTTOM OF STRATUM
Fill Sand & Gravel		6'
Fine Fill Clay		
Fill Clay, Sand & Gravel	9'	15'
Clay, Sand & Gravel	19'	34'
Yellow Sand & Gravel		
Heavy Clay to Rock		
Sand & Gravel	13'	45'
Blue Clay (Rock)		

8 SCREEN: Type: Stainless Steel Dia.: 4" Slot/Gauze # 25 Length 4' Set between 42 ft. and 42 ft. Fittings: K Packer. Ht. Plank.

9 STATIC WATER LEVEL 12 ft. below land surface

10 PUMPING LEVEL below land surface 40 ft. after ½ hrs. pumping 35 g.p.m.

____ ft. after ____ hrs. pumping ____ g.p.m.

11 WATER QUALITY in Parts Per Million: Iron (Fe) ____ Chlorides (Cl) ____ Hardness ____ Other ____

12 WELL HEAD COMPLETION: ☐ In Approved Pit ☒ Pitless Adapter ☐ 12" Above Grade

13 Well Grouted? ☒ Yes ☐ No ☐ Neat Cement ☒ Bentonite ☐ ____ Depth: From 42 ft. to 0 ft.

14 Nearest Source of possible contamination 50 feet E Direction Septic Type

Well disinfected upon completion ☒ Yes ☐ No

15 PUMP: ☐ Not installed Manufacturer's Name A.O. Packer

Model Number ____ HP ½ Volts 230

Length of Drop Pipe 32 ft. capacity 10 G.P.M.

Type: ☒ Submersible ☐ Jet ☐ Reciprocating

ADDED INFO BY DRILLER, ITEM NO. SEP 1982

*CORRECTED BY

**ADDITION BY

ELEVATION

DEPTH TO ROCK

USE A 2ND SHEET IF NEEDED

16 Remarks, elevation, source of data, etc.

SEP 27 1982

17 WATER WELL CONTRACTOR'S CERTIFICATION:

This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief. O. Bard Johnson 6658

REGISTERED BUSINESS NAME REGISTRATION NO.

Address 6553 Clarkston, Clarkston

Signed ____ AUTHORIZED REPRESENTATIVE Date July '82

D67d 100M (Rev. 12-68)

GEOLOGICAL SURVEY COPY

WATER WELL RECORD

ACT 294 PA 1965

MICHIGAN DEPARTMENT OF PUBLIC HEALTH

1 LOCATION OF WELL ... 12 1984

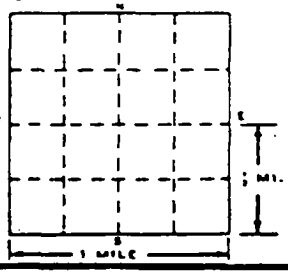
County	Township Name	Fraction	Section Number	Town Number	Range Number
OAKland	HIGHLAND	¼ ¼ ¼	11	3 N/S.	7 E/W.

Distance And Direction from Road Intersections

Street address & City of Well Location

Locate with "X" in Section below

Sketch Map:



3 OWNER OF WELL.

Address

4 WELL DEPTH: (completed) 62 ft. Date of Completion 7/26/83

5 ☐ Cable tool ☒ Rotary ☐ Driven ☐ Dug ☐ Hollow rod ☐ Jetted ☐ Bored ☐ ____

6 USE: ☐ Domestic ☒ Public Supply ☐ Industry ☐ Irrigation ☐ Air Conditioning ☐ Commercial ☐ Test Well ☐

7 CASING: Threaded ☒ Welded ☐ Height: Above/Below Surface 1 ft.

Diam. 4 in. to 58 ft. Depth Weight 11 lbs./ft.

____ in. to ____ ft. Depth Drive Shoe? Yes ☒ No ☐

2 FORMATION	THICKNESS OF STRATUM	DEPTH TO BOTTOM OF STRATUM
BR SD & GR	13	13
GR & BR CL & GR	3	16
WTR SD & GR	10	26
HARD PAN	26	52
FINE GR SD	4	56
GR WTR SD	6	62

USE A 2ND SHEET IF NEEDED

8 SCREEN:

Type: JOHNSON Dia.: 4"

Slot/Gauge 10 Length 4

Set between 58 ft. and 62 ft.

Fittings:

9 STATIC WATER LEVEL

18 ft. below land surface

10 PUMPING LEVEL below land surface

40 ft. after 2 hrs. pumping 18 g.p.m.

____ ft. after ____ hrs. pumping ____ g.p.m.

11 WATER QUALITY in Parts Per Million:

Iron (Fe) ____ Chlorides (Cl) ____

Hardness ____ Other ____

12 WELL HEAD COMPLETION: ☐ In Approved Pit ☒ Pitless Adapter ☒ 12" Above Grade

13 Well Grouted? ☐ Yes ☒ No ☐ Neat Cement ☐ Bentonite ☐ ____

Depth: From ____ ft. to ____ ft.

14 Nearest Source of possible contamination

65 feet N & W Direction SEPTIC Type

Well disinfected upon completion ☒ Yes ☐ No

15 PUMP: ☐ Not installed

Manufacturer's Name MYERS SJWJ 52

Model Number 5-11 HP ½ Volts 220

Length of Drop Pipe 40 ft. capacity 10 G.P.M.

Type: ☒ Submersible ☐ Jet ☐ Reciprocating

16 Remarks, elevation, source of data, etc.

ADDED INFO BY DRILLER, ITEM #11

*CORRECTED BY

**ADDITION BY

ELEVATION

DEPTH TO ROCK

17 WATER WELL CONTRACTOR'S CERTIFICATION:

This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

DUNSMORE WELL DRILLING 1213

REGISTERED BUSINESS NAME REGISTRATION NO.

Address 1017 CRUSE HARTLAND

Signed ____ Date Aug 8, 83

AUTHORIZED REPRESENTATIVE

D67d (COM (Rev. 12-68)

GEOLOGICAL SURVEY COPY

MAY 1 0 1984

WATER WELL AND PUMP RECORD

PART 127 ACT 368 P A 1978

PERMIT NUMBER

1 LOCATION OF WELL

County	Township Name	Fraction	Section Number	Town Number	Range Number
Oakland	Highland	NE¼ NE¼ NE¼	11	3 N/S	7 E/W

D [redacted]

Street Address or City of Well Location

Locate with X in Section Below

Sketch Map [redacted]

3 OWNER OF WELL

Address

Address Same As Well Location? ☒ Yes ☐ No

4 WELL DEPTH (completed)

30 ft

Date of Completion 4-14-83

5

☐ Cable tool ☐ Rotary ☐ Driven ☐ Dug
☒ Hollow rod ☐ Auger ☐ Jetted ☐

6 USE

☒ Domestic ☐ Type I Public ☐ Type III Public
☐ Irrigation ☐ Type IIa Public ☐ Heat pump
☐ Test Well ☐ Type IIb Public ☐

7 CASING

Diameter ☒ Steel ☐ Threaded ☐ Plastic ☐ Welded

2 in to 27 ft depth

in to ft depth

Grouted Drill Hole Diameter

in to ft depth

in to ft depth

Height Above/Below Surface 1 ft

Weight 3.25 lbs/ft

Drive Shoe ☐ Yes ☒ No

8 SCREEN

☐ Not Installed

Type SS Diameter 1¼

Slot/Gauge 10 Length 3½'

Set between 27 ft and 30 ft

FITTINGS ☐ K-Packer ☐ Lead Packer ☐ Bremer Check

☒ Blank above screen 1 ft Other

9 STATIC WATER LEVEL

12 ft below land surface ☐ Flow

10 PUMPING LEVEL below land surface

21 ft after 2 hrs pumping at 15 GPM

ft after hrs pumping at GPM

11 WELL HEAD COMPLETION

☒ Pitless adapter ☐ 12" above grade
☐ Basement offset ☐ Approved pit

12 WELL GROUTED?

☒ No ☐ Yes From to ft

☐ Neat cement ☐ Bentonite ☐ Other

No of bags of cement Additives

13 Nearest source of possible contamination

Type ~~50~~ Septic Distance 50 ft Direction N

Well constructed upon completion? ☒ Yes ☐ No

14 PUMP

☒ Not Installed ☐ Pump Installation Only

Manufacturer's name

Model number HP Volts

Length of Drop Pipe ft capacity GPM

TYPE ☐ Submersible ☐ Jet

PRESSURE TANK

Manufacturer's name

Model number Capacity Gallons

2 FORMATION DESCRIPTION

FORMATION DESCRIPTION	THICKNESS OF STRATUM	DEPTH TO BOTTOM OF STRATUM
Set Pipe in		
Sand Drive	27	27
Water Gravel	3	30

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Mich. Dept. of Public Health
MAR 2 C 1984
Bureau of Environmental and Occupational Health - GWQS
MAR - 5 1984

USE A 2ND SHEET IF NEEDED

15 Remarks, elevation, source of data, etc

WELL RECORD COMPLETED BY
CORRECTION BY
ADDITION BY
ELEVATION
DEPTH TO ROCK

16 WATER WELL CONTRACTOR'S CERTIFICATION

This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief

Frank Kennedy Well Drilling 03-124
REGISTERED BUSINESS NAME REGISTRATION NO

Address 2616 W Maple Ave Owosso

Signed Frank Kennedy Date 2-12-84
AUTHORIZED REPRESENTATIVE

3067d (Rev 10-80)

WATER WELL RECORD

ACT 294 PA 1965

MICHIGAN DEPARTMENT OF PUBLIC HEALTH

1 LOCATION OF WELL

County	Township Name	Fraction	Section Number	Town Number	Range Number
Oakland	Highland	[illegible]	11	3 N/S.	7 E/W.

Distance And Direction from Road Intersections: [illegible]

Street address & City of Well Location: 2861 [illegible]

Locate with "X" in section below — Sketch Map:

3 OWNER OF WELL: [illegible]

Address: [illegible]

4 WELL DEPTH: (completed) 46 ft. Date of Completion 2-15-84

5 [X] Cable tool [ ] Rotary [ ] Driven [ ] Dug [ ] Hollow rod [ ] Jetted [ ] Bored [ ] ____

6 USE: [X] Domestic [ ] Public Supply [ ] Industry [ ] Irrigation [ ] Air Conditioning [ ] Commercial [ ] Test Well [ ]

7 CASING: Threaded [X] Welded [ ] Diam. 4" — ___ in. to ___ ft. Depth; ___ in. to ___ ft. Depth

Height: Above/Below Surface 1 ft. Weight 11 lbs./ft. Drive Shoe? Yes [X] No [ ]

2 FORMATION

FORMATION	THICKNESS OF STRATUM	DEPTH TO BOTTOM OF STRATUM
Sand/Gravel/Sandy Clay	21	21
Clay Gravel	16	37
Sand/Gravel/[illegible]	9	46

USE A 2ND SHEET IF NEEDED

8 SCREEN: Type: Johnson Stainless Dia.: 4" Slot/Gauze: 10 Length: 4 [illegible] Set between 42 ft. and 46 ft. Fittings: K packer - Plugs [illegible] Pipe

9 STATIC WATER LEVEL 20 ft. below land surface

10 PUMPING LEVEL below land surface

26 ft. after 1 hrs. pumping 25 g.p.m.

26 ft. after 1 hrs. pumping 25 g.p.m.

11 WATER QUALITY in Parts Per Million: Iron (Fe) ____ Chlorides (Cl) ____ Hardness ____ Other ____

12 WELL HEAD COMPLETION: [ ] In Approved Pit [X] Pitless Adapter [X] 12" Above Grade

13 Well Grouted? [ ] Yes [ ] No [ ] Neat Cement [ ] Bentonite [ ] ____ Depth: From ____ ft. to ____ ft.

14 Nearest Source of possible contamination 50 feet [illegible] Direction Septic Type

Well disinfected upon completion [X] Yes [ ] No

15 PUMP: [ ] Not installed Manufacturer's Name Tait Model Number 5DL HP 1/2 Volts 230 Length of Drop Pipe 26 ft. capacity 10 G.P.M. Type: [X] Submersible [ ] Jet [ ] Reciprocating

RECEIVED Mich. Dept. of Public Health MAY 07 1985 Bureau of Environmental and Occupational Health Services

16 Remarks, elevation, source of data, etc.

17 WATER WELL CONTRACTOR'S CERTIFICATION:

This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

[illegible] Well Drilling 1-51[illegible]

REGISTERED BUSINESS NAME — REGISTRATION NO.

Address: [illegible] Highland

Signed: [illegible] Date: 5-27-84

AUTHORIZED REPRESENTATIVE

067d 100M (Rev. 12-68)

GEOLOGICAL SURVEY COPY

GEOLOGICAL SURVEY

WATER WELL AND PUMP RECORD

PERMIT NUMBER

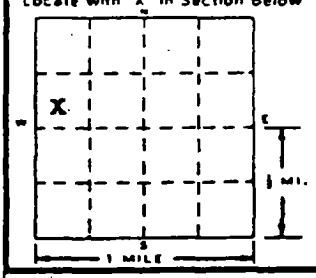
1 LOCATION OF WELL

County	Township Name	Fraction	Section Number	Town Number	Range Number
Oakland	Highland	SW ¼ NE ¼ SE ¼	11	3 N/S	7 E/W

Distance And Direction From Road Intersection

Street Address & City of Well Location

Locate with "X" in Section Below — Sketch Map



3 OWNER OF WELL

Address

Address Same As Well Location? ☒ Yes ☐ No

4 WELL DEPTH (completed) 45 ft. — **Date of Completion** 8-19-84

5 ☒ Cable tool ☐ Rotary ☐ Driven ☐ Dug ☐ Hollow rod ☐ Auger ☐ Jetted ☐ _____

6 USE ☒ Domestic ☐ Type I Public ☐ Type III Public ☐ Irrigation ☐ Type IIa Public ☐ Heat pump ☐ Test Well ☐ Type IIb Public ☐ _____

7 CASING: Diameter ☒ Steel ☐ Threaded ☐ Plastic ☒ Welded

4 in to 41 ft depth

_____ in to _____ ft depth

Grouted Drill Hole Diameter

_____ in to _____ ft. depth

_____ in to _____ ft. depth

Height: Above ~~Surface~~ XXX

Surface 1 ft.

Weight 10.40 lbs /ft

Drive Shoe ☒ Yes ☐ No

2 FORMATION DESCRIPTION	THICKNESS OF STRATUM	DEPTH TO BOTTOM OF STRATUM
drove		40
med. sand-water	5	45

8 SCREEN: ☐ Not Installed

Type Johnson — Diameter 3in.

Slot/~~Gauge~~ XXX 12 — Length 48in.

Set between 41 ft and 45 ft

FITTINGS ☒ K-Packer ☐ Lead Packer ☐ Bremer Check

☒ Blank above screen 1 ft Other _____

9 STATIC WATER LEVEL

21 ft below land surface ☐ Flow

10 PUMPING LEVEL: below land surface

21 ft. after 1 hrs pumping at 60 G.P.M.

_____ ft. after _____ hrs pumping at _____ G.P.M.

11 WELL HEAD COMPLETION ☒ Pitless adapter ☐ 12" above grade ☐ Basement offset ☐ Approved pit

12 WELL GROUTED? ☒ No ☐ Yes From _____ to _____ ft

☐ Neat cement ☐ Bentonite ☐ Other _____

No of bags of cement _____ Additives _____

13 Nearest source of possible contamination

Type ~~septic~~ septic Distance 54 ft Direction west

Well disinfected upon completion? ☒ Yes ☐ No

14 PUMP ☐ Not Installed ☐ Pump Installation Only

Manufacturer's name Red Jacket

Model number _____ HP 220 Volts 1/2

Length of Drop Pipe _____ ft capacity 10 G.P.M.

TYPE ☒ Submersible ☐ Jet _____

PRESSURE TANK

Manufacturer's name _____

Model number _____ Capacity _____ Gallons

USE A 2ND SHEET IF NECESSARY

RECEIVED
Mich. Dept. of Public Health
MAY 16 1985
Bureau of Environmental and Occupational Health - GWQS

15 Remarks, elevation, source of data, etc.

16. WATER WELL CONTRACTOR'S CERTIFICATION

This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief

Pettis Well Drilling 0413
REGISTERED BUSINESS NAME REGISTRATION NO.

Address 5575 Jackson Blvd. Davisburg

Signed _____ Date 5-13-85
AUTHORIZED REPRESENTATIVE

Authority: Act 368 PA 1978
Completion: Required
Penalty: Conviction of a violation of any provision is a

D67d 2/84

GEOLOGICAL SURVEY COPY

ACT 294 PA 1965

OF PUBLIC HEALTH

1 LOCATION OF WELL

County	Twp	Fraction	Section No	Town	Range
OAKLAND	[illegible]	NE NW SW	15	3 N/S	7 E/W

Distance And Direction from Road Intersections

OWNER No

Street address & City of Well Location [illegible]

3 OWNER OF WELL

COMFORT HOMES INC.

Address 2376 N MILFORD RD

2 FORMATION	THICKNESS OF STRATUM	DEPTH TO BOTTOM OF STRATUM
CLAY	16	18
GRAY SAND	25	43
CLAY	3	46
WATER SAND	7	53

4 WELL DEPTH: (completed) 53-0 ft. **Date of Completion** JAN 1970

5 ☒ Cable tool ☐ Rotary ☐ Driven ☐ Dug ☐ Hollow rod ☐ Jetted ☐ Bored ☐ ___

6 USE ☒ Domestic ☐ Public Supply ☐ Industry ☒ Irrigation ☐ Air Conditioning ☐ Commercial ☐ Test Well ☐ ___

7 CASING: Diam. 4 in. to 47 ft. Depth; Threaded ☒ Welded ☐; Height: Above/Below surface 1 ft.; Weight ___ lbs/ft.; ___ in. to ___ ft. Depth; Drive Shoe? Yes ☒ No ☐

8 SCREEN: Type STAINLESS Dia.: 3 ¼"; Slot/Gauze .015" Length 4'-9"; Set between 49 ft. and 53 ft.; Fittings: K PACKER + BLANK

9 STATIC WATER LEVEL 32 ft. below land surface

10 PUMPING LEVEL below land surface

36 ft. after 1 hrs. pumping 25 g.p.m.

___ ft. after ___ hrs. pumping ___ g.p.m.

11 WATER QUALITY in Parts Per Million:

Iron (Fe) ___ Chlorides (Cl) ___

Hardness ___

12 WELL HEAD COMPLETION: ☐ In Approved Pit ☒ Pitless Adapter ☐ 12" Above Grade

13 GROUTING:

Well Grouted? ☐ Yes ☒ No

Material: ☐ Neat Cement ☐ ___

Depth: From ___ ft. to ___ ft.

14 SANITARY:

Nearest Source of possible contamination

75 feet E Direction SEPTIC Type

Well disinfected upon completion ☒ Yes ☐ No

15 PUMP:

Manufacturer's Name RED JACKET

Model Number ___ HP ½

Length of Drop Pipe 45 ft. capacity 15 G.P.M.

Type: ☒ Submersible ☐ ___ ☐ Jet ☐ Reciprocating

16 Remarks, elevation, source of data, etc.

17 WATER WELL CONTRACTOR'S CERTIFICATION:

This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

THOMAS RICHARDSON — REGISTERED BUSINESS NAME

0781 — REGISTRATION NO.

Address 4725 WHITE LAKE RD

Signed [signature] — AUTHORIZED REPRESENTATIVE

Date Feb 20 1970

D670 100M 6-66

GEOLOGICAL SURVEY COPY

FEB 2? 1976

WATER WELL RECORD

ACT 294 PA 1965

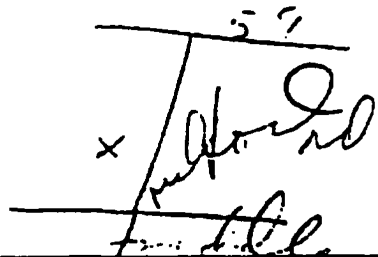
MICHIGAN DEPARTMENT OF PUBLIC HEALTH

1 LOCATION OF WELL

County: Oakland | Township Name: Highland | Fraction: SESE NW | Section Number: 15 | Town Number: 3 N | Range Number: 7 E

Distance And Direction from Road Intersections

Locate with "X" in section below — Sketch Map:



3 OWNER OF WELL: HI VALLEY MARKET

Address: MILFORD RD.

4 WELL DEPTH (completed): 61 ft. Date of Completion:

5 [x] Cable tool [ ] Rotary [ ] Driven [ ] Dug [ ] Hollow rod [ ] Jetted [ ] Bored [ ]

6 USE: [ ] Domestic [ ] Public Supply [ ] Industry [ ] Irrigation [ ] Air Conditioning [ ] Commercial [ ] Test Well [ ]

7 CASING: Threaded [ ] Welded [x] Height: Above/~~Below~~ Surface 1 ft.

Diam. 4 in. to 58 ft. Depth; Weight ___ lbs./ft.

___ in. to ___ ft. Depth; Drive Shoe? Yes [x] No [ ]

2 FORMATION	THICKNESS OF STRATUM	DEPTH TO BOTTOM OF STRATUM
Clay + Sand	44'	44'
Sand	17'	61'

USE A 2ND SHEET IF NEEDED

8 SCREEN: Type: Stainless St. Dia.: 3" Slot/~~Gauge~~: 12 Length: 3'

Set between 58 ft. and 61 ft.

Fittings: K. Neck Plug Coupling

9 STATIC WATER LEVEL ___ ft. below land surface

10 PUMPING LEVEL below land surface: 33 ft. after 1 hrs. pumping 20+ g.p.m.; ___ ft. after ___ hrs. pumping ___ g.p.m.

11 WATER QUALITY in Parts Per Million: Iron (Fe) ___ Chlorides (Cl) ___ Hardness ___ Other ___

12 WELL HEAD COMPLETION: [ ] In Approved Pit [x] Pitless Adapter [x] 12" Above Grade

13 Well Grouted? [ ] Yes [ ] No [ ] Neat Cement [ ] Bentonite [ ] ___ Depth: From ___ ft. to ___ ft.

14 Nearest Source of possible contamination ___ feet ___ Direction ___ Type; Well disinfected upon completion [ ] Yes [ ] No

15 PUMP: [ ] Not installed; Manufacturer's Name: Red Jacket; Model Number ___ HP 1/2 Volts 220; Length of Drop Pipe ___ ft. capacity 12 G.P.M.; Type: [x] Submersible [ ] Jet [ ] Reciprocating

OAKLAND COUNTY DEPT. OF HEALTH E.H.N.D.

16 Remarks, elevation, source of data, etc. DB

ADDED INFO BY DRILLER, ITEM NO.
*CORRECTED BY
**ADDITION BY
ELEVATION
DEPTH TO ROCK

17 WATER WELL CONTRACTOR'S CERTIFICATION: This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

REGISTERED BUSINESS NAME ___ REGISTRATION NO. 11

Address ___

Signed ___ AUTHORIZED REPRESENTATIVE Date ___

D67d 100M (Rev. 12-68)

GEOLOGICAL SURVEY COPY

WATER WELL RECORD

ACT 294 PA 1965

MICHIGAN DEPARTMENT OF PUBLIC HEALTH

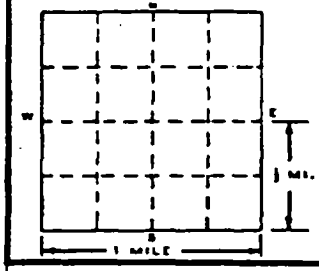
1 LOCATION OF WELL

County	Township Name	Fraction	Section Number	Town Number	Range Number
Oakland	Highland	~~NE NE SE~~ SW NE NE	23	3 N/S.	7 E/W.

Distance And Direction from Road Intersections: 4

Street address & City of Well Location:

Locate with "X" in section below



Sketch Map:

3 OWNER OF WELL: Johnson Homes

Address: P.O. Box 179, Union Lake

4 WELL DEPTH: (completed) 5 ft. Date of Completion 9-24-74

5 ☐ Cable tool ☐ Rotary ☐ Driven ☐ Dug ☒ Hollow rod ☐ Jetted ☐ Bored ☐ ____

6 USE: ☒ Domestic ☐ Public Supply ☐ Industry ☐ Irrigation ☐ Air Conditioning ☐ Commercial ☐ Test Well ☐ ____

7 CASING: Threaded ☒ Welded ☐ Height: Above/~~Below~~ Surface 1 ft.

Diam. 2 in. to 47 ft. Depth; Weight 3.75 lbs./ft.

____ in. to ____ ft. Depth; Drive Shoe? Yes ☐ No ☒

2 FORMATION	THICKNESS OF STRATUM	DEPTH TO BOTTOM OF STRATUM
Stood pipe in sand - drove	42	42
Water gravel	9	51

8 SCREEN: Type: Slotted Dia.: 1¼"

Slot/Gauze 12 Length 4 ft.

Set between 47 ft. and 51 ft.

Fittings:

9 STATIC WATER LEVEL 14 ft. below land surface

10 PUMPING LEVEL below land surface

____ ft. after ____ hrs. pumping ____ g.p.m.

____ ft. after ____ hrs. pumping ____ g.p.m.

11 WATER QUALITY in Parts Per Million:

Iron (Fe) ____ Chlorides (Cl) ____

Hardness ____ Other ____

12 WELL HEAD COMPLETION: ☐ In Approved Pit ☒ Pitless Adapter ☐ 12" Above Grade

13 Well Grouted? ☐ Yes ☒ No ☐ Neat Cement ☐ Bentonite ☐ ____

Depth: From ____ ft. to ____ ft.

14 Nearest Source of possible contamination

50 feet W Direction Septic tank Type

Well disinfected upon completion ☒ Yes ☐ No

15 PUMP: ☒ Not installed

Manufacturer's Name ____

Model Number ____ HP ____ Volts ____

Length of Drop Pipe ____ ft. capacity ____ G.P.M.

Type: ☐ Submersible ☐ Jet ☐ Reciprocating

USE A 2ND SHEET IF NEEDED ITEM NO.

16 Remarks, elevation, source of data, etc.

17 WATER WELL CONTRACTOR'S CERTIFICATION:

This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

~~Fettig Well Drilling~~ REGISTERED BUSINESS NAME; 0413 REGISTRATION NO.

Address 1051 Round Lake, Wood

Signed Jerry Fettig (AUTHORIZED REPRESENTATIVE) Date 3-25-75

D67d 100M (Rev. 12-68)

OCT 0 2 1975

WATER WELL RECORD

ACT 294 PA 1965

MICHIGAN DEPARTMENT OF PUBLIC HEALTH

1 LOCATION OF WELL

County	Township Name	Fraction	Section Number	Town Number	Range Number
Oakland	Highland	SE ¼ NE ¼ SE ¼	2	3 N.	7 E.

Distance And Direction from Road Intersections

Street address & City of Well Location

Locate with "X" in section below — Sketch Map: [redacted]

1 MILE

2 FORMATION

FORMATION	THICKNESS OF STRATUM	DEPTH TO BOTTOM OF STRATUM
Brown clayey sand	17'	17'
Brown sand, some gravel	15'	32'
Grey clay	04'	36'
Brown sand, some gravel	27'	63'
Grey sandy clay, some gravel	110'	173'
Grey coarse water-bearing sand	05'	178'

USE A 2ND SHEET IF NEEDED

OAKLAND CO. DEPT. OF HEALTH ... 1975 ... E.H.N.O.

3 OWNER OF WELL:

Address

4 WELL DEPTH: (completed) 178 ft. Date of Completion Aug., 1975

5
[X] Cable tool [ ] Rotary [ ] Driven [ ] Dug
[ ] Hollow rod [ ] Jetted [ ] Bored [ ]

6 USE:
[X] Domestic [ ] Public Supply [ ] Industry
[ ] Irrigation [ ] Air Conditioning [ ] Commercial
[ ] Test Well [ ]

7 CASING: Threaded [ ] Welded [X]
Diam. 4 in. to 174 ft. Depth
in. to ft. Depth

Height: Above/Below Surface 1 ft.
Weight 10.79 lbs./ft.
Drive Shoe? Yes [X] No [ ]

8 SCREEN:
Type: Stainless Dia.: 3 5/8"
Slot/Gauze 10 Length 4'
Set between 174 ft. and 178 ft.
Fittings: K-Packer

9 STATIC WATER LEVEL
55 ft. below land surface

10 PUMPING LEVEL below land surface
110 ft. after 2 hrs. pumping 12 g.p.m.
ft. after hrs. pumping g.p.m.

11 WATER QUALITY in Parts Per Million:
Iron (Fe) Chlorides (Cl)
Hardness Other

12 WELL HEAD COMPLETION:
[ ] In Approved Pit
[X] Pitless Adapter [ ] 12" Above Grade

13 Well Grouted? [ ] Yes [X] No
[ ] Neat Cement [ ] Bentonite [ ]
Depth: From ft. to ft.

14 Nearest Source of possible contamination
50 feet Direction Septic Type
Well disinfected upon completion [X] Yes [ ] No

15 PUMP:
[ ] Not installed
Manufacturer's Name Sta-Rite
Model Number 8P4D2 HP 3/4 Volts 230
Length of Drop Pipe 147 ft. capacity 8 G.P.M.
Type: [X] Submersible
[ ] Jet [ ] Reciprocating

16 Remarks, elevation, source of data, etc.
ADDED INFO BY DRILLER, ITEM NO.
CORRECTED BY
ADDITION BY
ELEVATION
DEPTH TO ROCK

REK

17 WATER WELL CONTRACTOR'S CERTIFICATION:
This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

James N. Layman — REGISTERED BUSINESS NAME
0645 — REGISTRATION NO.

Address 10275 Eagle Rd., Davisburg, Mich.

Signed James N Layman (AUTHORIZED REPRESENTATIVE) Date 8/10/75

D67d 100M (Rev. 12-68)

GEOLOGICAL SURVEY COPY

MAY 10 1984

WATER WELL RECORD

ACT 294 PA 1965

MICHIGAN DEPARTMENT OF PUBLIC HEALTH

1 LOCATION OF WELL

County	Township Name	Fraction	Section Number	Town Number	Range Number
Oakland	Highland	SE ¼ SE ¼ SW ¼	9	3 N/S.	7 E/W.

Distance And Direction from Road Intersections: [illegible]

Street address & City of Well Location: [illegible]

Locate with "X" in section below — Sketch Map:

(section grid: W – E, 1 MI., 1 MILE)

3 OWNER OF WELL: [illegible]

Address: [illegible]

4 WELL DEPTH: (completed) 30 ft. Date of Completion 4/2/83

5 ☐ Cable tool ☐ Rotary ☐ Driven ☐ Dug ☐ Hollow rod ☒ Jetted ☐ Bored ☐ ____

6 USE: ☒ Domestic ☐ Public Supply ☐ Industry ☐ Irrigation ☐ Air Conditioning ☐ Commercial ☐ Test Well ☐

7 CASING: Threaded ☒ Welded ☐
Diam. 2 in. to 30 ft. Depth; ____ in. to ____ ft. Depth
Height: Above/Below Surface ____ ft.
Weight ____ lbs./ft.
Drive Shoe? Yes ☒ No ☐

2 FORMATION

FORMATION	THICKNESS OF STRATUM	DEPTH TO BOTTOM OF STRATUM
Sand/Gravel	24	24
Sand/Gravel/water Bearing	6	30

USE A 2ND SHEET IF NEEDED

8 SCREEN:
Type: Johnson [illegible] Dia.: 1¼
Slot/Gauze 10 Length 3 ft
Set between 27 ft. and 30 ft.
Fittings: Tail pipe + Brass Check

9 STATIC WATER LEVEL
15 ft. below land surface

10 PUMPING LEVEL below land surface
15 ft. after 1 hrs. pumping 15 g.p.m.
15 ft. after ½ hrs. pumping 15 g.p.m.

11 WATER QUALITY in Parts Per Million:
Iron (Fe) ____ Chlorides (Cl) ____
Hardness ____ Other ____

12 WELL HEAD COMPLETION: ☐ In Approved Pit ☒ Pitless Adapter ☒ 12" Above Grade

13 Well Grouted? ☐ Yes ☐ No
☐ Neat Cement ☐ Bentonite ☐ ____
Depth: From ____ ft. to ____ ft.

14 Nearest Source of possible contamination
55 feet N Direction Septic Type
Well disinfected upon completion ☒ Yes ☐ No

15 PUMP: ☒ Not installed
Manufacturer's Name ____
Model Number ____ HP ____ Volts ____
Length of Drop Pipe ____ ft. capacity ____ G.P.M.
Type: ☐ Submersible ☐ Jet ☐ Reciprocating

RECEIVED
Mich. Dept. of Public Health
MAR 2 0 1984
Bureau of Environmental and Occupational Health - GWQS

16 Remarks, elevation, source of data, etc.

ADDED INFO BY DRILLER, ITEM NO.
CORRECTED BY
ADDITION BY
ELEVATION
TO ROCK

17 WATER WELL CONTRACTOR'S CERTIFICATION:
This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

Paul Alex Well Drilling — C311
REGISTERED BUSINESS NAME — REGISTRATION NO.

Address 4794 N. Duck Lk Rd. Highland

Signed Paul [illegible] — AUTHORIZED REPRESENTATIVE — Date 4/2/83

D67d 100M (Rev. 12-68)

GEOLOGICAL SURVEY COPY

GEOLOGICAL SURVEY NO [ ]

W..ER WELL AND PUMP RECO

PERMIT NUMBER [ ]

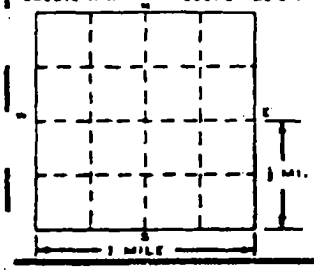
1 LOCATION OF WELL

County	Township Name	Fraction	Section Number	Town Number	Range Number
Oakland	Highland	se ¼ se ¼ ne ¼	9	3 N/S	7 E/W

Distance And Direction From Road Intersection

Street Address & City of Well Location

Locate with "X" in Section Below — Sketch Map:



3 OWNER OF WELL

Address

Address Same As Well Location? [X] Yes [ ] No

4 WELL DEPTH (completed) 51 ft — **Date of Completion** 8--8-84

5 [X] Cable tool [ ] Rotary [ ] Driven [ ] Dug [ ] Hollow rod [ ] Auger [ ] Jetted [ ] ____

6 USE [X] Domestic [ ] Type I Public [ ] Type III Public [ ] Irrigation [ ] Type IIa Public [ ] Heat pump [ ] Test Well [ ] Type IIb Public [ ]

7 CASING Diameter [X] Steel [ ] Threaded [ ] Plastic [X] Welded
4 in. to 47 ft. depth
____ in. to ____ ft. depth
Grouted Drill Hole Diameter
____ in. to ____ ft. depth
____ in. to ____ ft. depth
Height: Above ~~Ground~~ Surface 1 ft
Weight 10.40 lbs /ft
Drive Shoe [X] Yes [ ] No

2 FORMATION DESCRIPTION	THICKNESS OF STRATUM	DEPTH TO BOTTOM OF STRATUM
bron sand		6
gray sand--blue clay	33	39
coarse gravel-water sand	12	51

8 SCREEN [ ] Not installed
Type Johnson Diameter 3in.
Slot/~~Gauge~~ 12 Length 48in.
Set between 47 ft and 51 ft
FITTINGS [X] K-Packer [ ] Lead Packer [ ] Bremer Check
[ ] Blank above screen ____ ft Other ____

9 STATIC WATER LEVEL
7 ft below land surface [ ] Flow

10 PUMPING LEVEL below land surface
31 ft after 1 hrs pumping at 65 G P M
____ ft. after ____ hrs pumping at ____ G P M

11 WELL HEAD COMPLETION [X] Pitless adapter [ ] 12" above grade [ ] Basement offset [ ] Approved pit

12 WELL GROUTED? [X] No [ ] Yes From ____ to ____ ft
[ ] Neat cement [ ] Bentonite [ ] Other ____
No. of bags of cement ____ Additives ____

13 Nearest source of possible contamination
Type septic Distance 55 ft Direction ~~east~~
Well disinfected upon completion? [X] Yes [ ] No

14 PUMP [ ] Not installed [ ] Pump Installation Only
Manufacturer's name ~~Red Jacket~~
Model number ____ HP ~~1/2~~ Volts ~~220~~
Length of Drop Pipe 30 ft capacity ~~10~~ G P M
TYPE [X] Submersible [ ] Jet ____
PRESSURE TANK
Manufacturer's name ____
Model number ~~WX203~~ Capacity ____ Gallons

USE A 2ND SHEET IF NEEDED

RECEIVED
Dept. of Public Health
MAY 16 1985
Bureau of Environmental and Occupational Health - GWQS

15 Remarks, elevation, source of data, etc

16. WATER WELL CONTRACTOR'S CERTIFICATION
This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief

Fettig Well DRilling 0413
REGISTERED BUSINESS NAME REGISTRATION NO
Address 5575 Jackson Blvd. Davisburg
Signed Jerry L Fettig Pres Date 5-10--85
AUTHORIZED REPRESENTATIVE

Authority: Act 368 PA 1978
Completion: Required
Penalty: Conviction of a violation of any provision is a misdemeanor

D67a 2/84

GEOLOGICAL SURVEY COPY

GEOLOGICAL SURVEY NO

W..TER WELL AND PUMP RECC)

PERMIT NUMBER

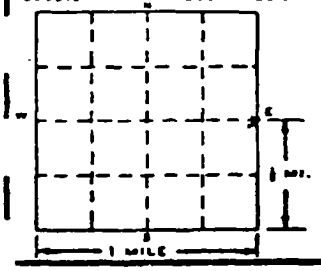
1 LOCATION OF WELL

County	Township Name	Fraction	Section Number	Town Number	Range Number
Oakland	Highland	NE¼ NE¼ SE¼	9	3 N/S	7 E/W

Distance And Direction From Road Intersection

Street Address & City of Well Location

Locate with "X" in Section Below



[redacted]

3 OWNER OF WELL

Address

Address Same As Well Location? ☒ Yes ☐ No

4 WELL DEPTH (completed) 93 ft

Date of Completion Dec-28-84

5 ☒ Cable tool ☐ Rotary ☒ Driven ☐ Dug ☐ Hollow rod ☐ Auger ☐ Jetted ☐ _____

6 USE ☒ Domestic ☐ Type I Public ☐ Type III Public ☐ Irrigation ☐ Type IIa Public ☐ Heat pump ☐ Test Well ☐ Type IIb Public ☐

7 CASING Diameter ☒ Steel ☐ Threaded ☐ Plastic ☒ Welded

4 in to 89 ft depth

_____ in to _____ ft depth

Grouted Dril Hole Diameter

_____ in to _____ ft depth

_____ in to _____ ft depth

Height: Above/Below 6

Surface 1 ft.

Weight 11 lbs /ft

Drive Shoe ☒ Yes ☐ No

2 FORMATION DESCRIPTION	THICKNESS OF STRATUM	DEPTH TO BOTTOM OF STRATUM
Brown Sand	4	4
yellow Sand	10	14
Brown gravel + Sand	16	30
grey clay	5	35
Putty Sand	10	45
yellow Sand (Very fine)	30	75
Very fine grey Sand	18	93

8 SCREEN ☐ Not Installed

Type Johnson SS Diameter 4

Slot Gauze 7 Length 4'

Set between 89 ft and 93 ft.

FITTINGS ☒ K-Packer ☐ Lead Packer ☐ Bremer Check

☒ Blank above screen 16 ft Other _____

9 STATIC WATER LEVEL

30 ft below land surface ☐ Flow

10 PUMPING LEVEL below land surface

70 ft. after 2 hrs pumping at 18 G.P.M

_____ ft. after _____ hrs pumping at _____ G.P.M.

11 WELL HEAD COMPLETION ☐ Pitless adapter ☒ 12" above grade ☐ Basement offset ☐ Approved pit

12 WELL GROUTED? ☒ No ☐ Yes From _____ to _____ ft

☐ Neat cement ☐ Bentonite ☐ Other _____

No of bags of cement _____ Additives _____

13 Nearest source of possible contamination

Type Septic Distance 53 ft Direction NE

Well disinfected upon completion? ☒ Yes ☐ No

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JAN 7 1985
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JAN-1 1985

14 PUMP ☐ Not installed ☐ Pump installation Only

Manufacturer's name Red Jacket

Model number 75 W 1 125 HP 3/4 Volts 230

Length of Drop Pipe 73 ft capacity 18 GPM

TYPE ☒ Submersible ☐ Je: _____

PRESSURE TANK

Manufacturer's name Well X Trol

Model number 202 Capacity 40 Gallons

USE A 2ND SHEET IF NEEDED

15 Remarks, elevation, source of data, etc.

16 WATER WELL CONTRACTOR'S CERTIFICATION.

This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief

Ernest C. Morris Inc 63-1154

REGISTERED BUSINESS NAME REGISTRATION NO

Address 840 N. Lyncrest Highland

Signed Michael J. Morris Date 12-28-84

AUTHORIZED REPRESENTATIVE

D67d 2/84

Authority: Act 368 PA 1978
Completion: Required
Penalty: Conviction of a violation of any provision is a

GEOLOGICAL SURVEY COPY

GEOLOGICAL SURVEY

W. ER WELL AND PUMP RECO

PERMIT NUMBER

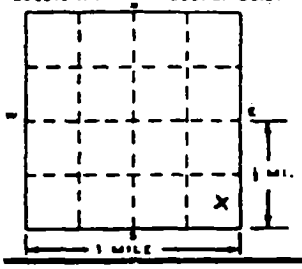
1 LOCATION OF WELL

County	Township Name	Fraction	Section Number	Town Number	Range Number
Oakland	Highland	SE¼ SE¼ SE¼	9	3 N/S	7 E/W

Distance And Direction From Road Intersection

Street Address & City of Well Location

Locate with "X" in Section Below



3 OWNER OF WELL

Address

Address Same As Well Location? ☑ Yes ☐ No

4 WELL DEPTH (completed) 28 ft. | **Date of Completion** 9-20-84

5 ☐ Cable tool ☐ Rotary ☑ Driven ☐ Dug ☐ Hollow rod ☐ Auger ☑ Jetted ☐

6 USE ☑ Domestic ☐ Type I Public ☐ Type III Public ☐ Irrigation ☐ Type IIa Public ☐ Heat pump ☐ Test Well ☐ Type IIb Public ☐

7 CASING: Diameter ☐ Steel ☑ Threaded ☐ Plastic ☐ Welded

2 in. to 28 ft. depth

___ in. to ___ ft. depth

Grouted Drill Hole Diameter

___ in. to ___ ft. depth

___ in. to ___ ft. depth

Height: Above Surface 1 ft

Weight 3.5 lbs /ft

Drive Shoe ☑ Yes ☐ No

2 FORMATION DESCRIPTION	THICKNESS OF STRATUM	DEPTH TO BOTTOM OF STRATUM
Driven	21	21
gravel	7	28

8 SCREEN ☐ Not Installed

Type Stainless Diameter 1¼

Slot 12 Length 3'

Set between 28 ft. and 31 ft.

FITTINGS ☐ K-Packer ☐ Lead Packer ☑ Bremer Check

☑ Blank above screen 3 ft. Other

9 STATIC WATER LEVEL:

15 ft. below land surface ☐ Flow

10 PUMPING LEVEL: below land surface

15 ft. after 1 hrs. pumping at 12 G.P.M

___ ft. after ___ hrs. pumping at ___ G.P.M.

11 WELL HEAD COMPLETION: ☑ Pitless adapter ☑ 12" above grade ☐ Basement offset ☐ Approved pit

12 WELL GROUTED? ☑ No ☐ Yes From ___ to ___ ft.

☐ Neat cement ☐ Bentonite ☐ Other

No. of bags of cement ___ Additives

13 Nearest source of possible contamination

Type Septic Distance 57 ft. Direction S

Well disinfected upon completion? ☑ Yes ☐ No

14 PUMP ☑ Not Installed ☐ Pump Installation Only

Manufacturer's name

Model number HP Volts

Length of Drop Pipe ft. capacity G.P.M

TYPE ☐ Submersible ☐ Jet

PRESSURE TANK

Manufacturer's name

Model number Capacity Gallons

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Mich. Dept. of Public Health
DEC 14 1984
Bureau of Environmental and Occupational Health GWQS

USE A 2ND SHEET IF NEEDED

15. Remarks, elevation, source of data, etc.

DEC 17 1984

16. WATER WELL CONTRACTOR'S CERTIFICATION:

This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief

Ernest C. Morris Inc. 63-1154
REGISTERED BUSINESS NAME REGISTRATION NO

Address 840 N. Lakeview Highland Mi

Signed Michael J. Morris Date 9-21-84
AUTHORIZED REPRESENTATIVE

D67d 2/84

Authority: Act 368 PA 1978
Completion: Required
Penalty: Conviction of a violation of any provision is a misdemeanor

GEOLOGICAL SURVEY COPY

WATER WELL RECORD

ACT 294 PA 1965

MICHIGAN DEPARTMENT OF PUBLIC HEALTH

1 LOCATION OF WELL

County	Township Name	Fraction	Section Number	Town Number	Range Number
Oakland	Highland	NE ¼ NW ¼ SE ¼	10	3 N/S.	7 E/W.

Distance And Direction from Road Intersections

Street address & City of Well Location

Locate with "X" in section below. Sketch Map:

[redacted]

1 MILE

3 OWNER OF WELL:

Address

4 WELL DEPTH: (completed) Date of Completion

45 ft.

5 ☒ Cable tool ☐ Rotary ☐ Driven ☐ Dug ☐ Hollow rod ☐ Jetted ☐ Bored ☐

6 USE: ☒ Domestic ☐ Public Supply ☐ Industry ☐ Irrigation ☐ Air Conditioning ☐ Commercial ☐ Test Well ☐

7 CASING: Threaded ☒ Welded ☐ Diam.

4 in. to 41 ft. Depth

___ in. to ___ ft. Depth

Height: Above/Below Surface 1 ft.

Weight 11.0 lbs./ft.

Drive Shoe? Yes ☒ No ☐

2

FORMATION	THICKNESS OF STRATUM	DEPTH TO BOTTOM OF STRATUM
Grn. Sand	21	21
Gray Clay	12	33
Gray Sand	12	45

USE A 2ND SHEET IF NEEDED

8 SCREEN:

Type: Johnson Stainless Dia.: 3"

Slot/Gauze 15 Length 4'

Set between 41 ft. and 45 ft.

Fittings: K-Packer

9 STATIC WATER LEVEL

20 ft. below land surface

10 PUMPING LEVEL below land surface

30 ft. after ½ hrs. pumping 60 g.p.m.

___ ft. after ___ hrs. pumping ___ g.p.m.

11 WATER QUALITY in Parts Per Million:

Iron (Fe) ___ Chlorides (Cl) ___

Hardness ___ Other ___

12 WELL HEAD COMPLETION: ☐ In Approved Pit ☒ Pitless Adapter ☒ 12" Above Grade

13 Well Grouted? ☐ Yes ☒ No

☐ Neat Cement ☐ Bentonite ☐ ___

Depth: From ___ ft. to ___ ft.

14 Nearest Source of possible contamination

55 feet NE Direction Septic Type

Well disinfected upon completion ☒ Yes ☐ No

15 PUMP: ☐ Not installed

Manufacturer's Name Webtrol

Model Number ___ HP ½ Volts 230

Length of Drop Pipe 28 ft. capacity 15 G.P.M.

Type: ☒ Submersible ☐ Jet ☐ Reciprocating

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Mich. Dept. of Public Health
MAR 28 1985
Bureau of Environmental and Occupational Health - GWQS

16 Remarks, elevation, source of data, etc.

17 WATER WELL CONTRACTOR'S CERTIFICATION:

This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

Harrison Drilling — 1735

REGISTERED BUSINESS NAME — REGISTRATION NO.

Address [illegible]

Signed [illegible] AUTHORIZED REPRESENTATIVE Date [illegible]

767d 100M (Rev. 12-68)

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(1) SEFL21 198

WATER WELL RECORD
ACT 294 PA 1965

MICHIGAN DEPARTMENT OF PUBLIC HEALTH

1 LOCATION OF WELL

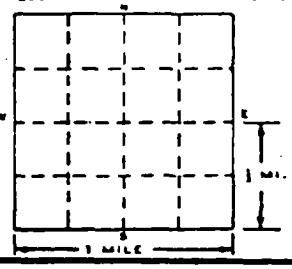
County	Township Name	Fraction	Section Number	Town Number	Range Number
Oakland	Highland	¼ ¼ SE ¼	2	3 N/S.	7 E/W.

Distance And Direction from Road Intersections

d)

Street address & City of Well Location

Locate with "X" in section below — Sketch Map:



3 OWNER OF WELL: Highland Hills Golf Course
Address 2075 Oakland Dr.
Box 509 Highland, Michigan 48031

4 WELL DEPTH: (completed) 82 ft. — Date of Completion 5-13-81

5 [X] Cable tool [ ] Rotary [ ] Driven [ ] Dug [ ] Hollow rod [ ] Jetted [ ] Bored [ ] ____

6 USE: [ ] Domestic [ ] Public Supply [ ] Industry [ ] Irrigation [ ] Air Conditioning [ ] Commercial [ ] Test Well [ ] Golf Course

7 CASING: Threaded [X] Welded [ ] — Height: Above/Below Grade Level
Diam. 8 in. to 57'9" ft. Depth — Surface ____ ft.
____ in. to ____ ft. Depth — Weight 29.35 lbs./ft.
Drive Shoe? Yes [X] No [ ]

2 FORMATION	THICKNESS OF STRATUM	DEPTH TO BOTTOM OF STRATUM
Top Soil	1'	1'
Sandy Yellow Clay	6'	7'
Yellow Sand	2'	9'
Hard Yellow Stony Clay	14'	23'
Boulder		23'
Hardpan W/some stones	29'	52'
Fine Dirty Water Sand	2'	54'
Clean water sand	28'	82'
Fine Putty Sand	1'	83'

8 SCREEN: Johnson Stainless
Type: Steel Dia.: 8"
Slot/Gauze 13 Length 24'
Set between 55'9" ft. and 82' ft.
Fittings:

9 STATIC WATER LEVEL
14" ft. below land surface

10 PUMPING LEVEL below land surface
47½ ft. after 8 hrs. pumping 270 g.p.m.
____ ft. after ____ hrs. pumping ____ g.p.m.

11 WATER QUALITY in Parts Per Million:
Iron (Fe) 3.1 Chlorides (Cl) 51
Hardness 340 Other ____

12 WELL HEAD COMPLETION: [ ] In Approved Pit [X] Pitless Adapter [ ] 12" Above Grade

13 Well Grouted? [ ] Yes [X] No
[ ] Neat Cement [ ] Bentonite [ ] ____
Depth: From ____ ft. to ____ ft.

14 Nearest Source of possible contamination Unknown
____ feet ____ Direction ____ Type
Well disinfected upon completion [X] Yes [ ] No

15 PUMP: [ ] Not installed
Manufacturer's Name Red Jacket
Model Number 500T5-19B4 HP 5 Volts 460
Length of Drop Pipe 52 ft. capacity 250 G.P.M.
Type: [X] Submersible [ ] Jet [ ] Reciprocating

USE A 2ND SHEET IF NEEDED

AUG 11 1981

16 Remarks, elevation, source of data, etc.

ADDED INFO. BY DRILLER [illegible]

CORRECTED BY [illegible]

ADDITION [illegible]

17 WATER WELL CONTRACTOR'S CERTIFICATION:
This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

O. O. Corsaut, Inc. — REGISTERED BUSINESS NAME — 0025 — REGISTRATION NO.

Address 15101 W. 11 Mile Road, Oak Park 48237

Signed [signature] — AUTHORIZED REPRESENTATIVE — Date July 29, 1981

D67d 100M (Rev. 12-68)

GEOLOGICAL SURVEY COPY

WATER WELL RECORD

ACT 294 PA 1965

MICHIGAN DEPARTMENT OF PUBLIC HEALTH

1 LOCATION OF WELL

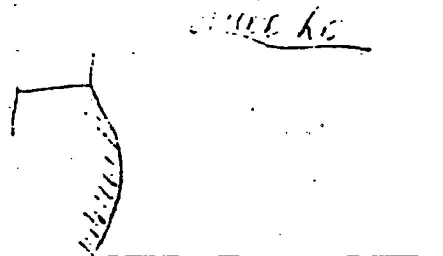
County	Township Name	Fraction	Section Number	Town Number	Range Number
Oakland	Highland	[illegible]	11	T3N N/S.	R7E E/W.

Distance And Direction from Road Intersections: [illegible]

Street address & City of Well Location: [illegible]

Locate with "X" in section below — X (NW corner of section grid; N, S, E, W; 1 MI.; 1 MILE)

Sketch Map: [illegible]



3 OWNER OF WELL: Manor Craft Homes, Inc.

Address: 119 Peninsula Dr, Highland, MI 48031

4 WELL DEPTH: (completed) 30 ft. Date of Completion 6/15/1984

5 ☐ Cable tool ☐ Rotary ☐ Driven ☐ Dug ☑ Hollow rod ☑ Jetted ☐ Bored ☐ ______

6 USE: ☑ Domestic ☐ Public Supply ☐ Industry ☐ Irrigation ☐ Air Conditioning ☐ Commercial ☐ Test Well ☐

7 CASING: Threaded ☑ Welded ☐ Diam. 2

2 in. to 27 ft. Depth
____ in. to ____ ft. Depth

Height: Above/Below Surface 1 ft.
Weight 11 lbs./ft.
Drive Shoe? Yes ☑ No ☐

2 FORMATION

FORMATION	THICKNESS OF STRATUM	DEPTH TO BOTTOM OF STRATUM
Brown Sand	0	15
Blue Sand & Clay	15	20
Gray Sand & Gravel M%	20	30

8 SCREEN:
Type: Johnson [illegible] Dia.: 1¼
Slot/Gauze 10 Length 3'
Set between 27 ft. and 30 ft.
Fittings: Premier [illegible]

9 STATIC WATER LEVEL
12 ft. below land surface

10 PUMPING LEVEL below land surface
15 ft. after 1 hrs. pumping 10 g.p.m.
16 ft. after 2 hrs. pumping 10 g.p.m.

11 WATER QUALITY in Parts Per Million:
Iron (Fe) ______ Chlorides (Cl) ______
Hardness ______ Other ______

12 WELL HEAD COMPLETION: ☐ In Approved Pit ☑ Pitless Adapter ☑ 12" Above Grade

13 Well Grouted? ☐ Yes ☑ No
☐ Neat Cement ☐ Bentonite ☐ ______
Depth: From ______ ft. to ______ ft.

14 Nearest Source of possible contamination
50 feet S Direction Septic Type
Well disinfected upon completion ☑ Yes ☐ No

15 PUMP: ☐ Not installed
Manufacturer's Name F&W
Model Number [illegible] HP ½ Volts 115
Length of Drop Pipe 21 ft. capacity 10 G.P.M.
Type: ☐ Submersible ☑ Jet ☐ Reciprocating

USE A 2ND SHEET IF NEEDED

RECEIVED
Mich. Dept. of Public Health

16 Remarks, elevation, source of data, etc.

MAR 11 1985

Bureau of Environmental and Occupational Health - GWQS

17 WATER WELL CONTRACTOR'S CERTIFICATION:
This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

[illegible] Drilling — REGISTERED BUSINESS NAME — 63-1946 REGISTRATION NO.

Address 4290 [illegible] Lake Rd Highland, Mi

Signed [signature] AUTHORIZED REPRESENTATIVE Date 6/15/84

D67d 100M (Rev. 12-68)

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WATER WELL RECORD
ACT 294 PA 1965

MICHIGAN DEPARTMENT OF PUBLIC HEALTH

1 LOCATION OF WELL

County	Township Name	Fraction	Section Number	Town Number	Range Number
OAKLAND	HIGHLAND	NW¼ SE¼	10	T3N N/S.	R7E E/W.

Distance And Direction from Road Intersections

Street address & City of Well Location

Locate with "X" in section below — Sketch Map: CRAFT RD; PENINSULA T; HIGHLAND RD; 1 MILE; 1 MI.

3 OWNER OF WELL: HIGHLAND CRAFT HOMES, INC.
Address 119 PENINSULA RD. HIGHLAND, MICH 48131

4 WELL DEPTH: (completed) 40 ft. Date of Completion 11/15/85

5 ☐ Cable tool ☐ Rotary ☐ Driven ☐ Dug ☑ Hollow rod ☑ Jetted ☐ Bored ☐ ____

6 USE: ☐ Domestic ☐ Public Supply ☐ Industry ☐ Irrigation ☐ Air Conditioning ☐ Commercial ☐ Test Well ☐ ____

7 CASING: Threaded ☑ Welded ☐ Diam. 2
37 in. to 40 ft. Depth
____ in. to ____ ft. Depth
Height: Above/Below Surface 1 ft.
Weight 11 lbs./ft.
Drive Shoe? Yes ☑ No ☐

2 FORMATION	THICKNESS OF STRATUM	DEPTH TO BOTTOM OF STRATUM
BROWN SAND	0	20
BROWN SAND, GRAVEL (LT)	20	29
WATER SAND, GRAVEL	29	40

8 SCREEN: Type: JOHNSON STAINLESS Dia.: 1¼
Slot/Gauze 10 Length 3FT
Set between 37 ft. and 40 ft.
Fittings: BLIND CHECK UNION

9 STATIC WATER LEVEL 18 ft. below land surface

10 PUMPING LEVEL below land surface
18 ft. after ½ hrs. pumping 10 g.p.m.
19 ft. after 1 hrs. pumping 10 g.p.m.

11 WATER QUALITY in Parts Per Million:
Iron (Fe) ____ Chlorides (Cl) ____
Hardness ____ Other ____

12 WELL HEAD COMPLETION: ☐ In Approved Pit ☑ Pitless Adapter ☑ 12" Above Grade

13 Well Grouted? ☐ Yes ☑ No
☐ Neat Cement ☐ Bentonite ☐ ____
Depth: From ____ ft. to ____ ft.

14 Nearest Source of possible contamination
60 feet 5 Direction SEPT. C Type
Well disinfected upon completion ☑ Yes ☐ No

15 PUMP: ☐ Not installed
Manufacturer's Name FLINT & WALLING
Model Number CPIOSS HP ½ Volts 230
Length of Drop Pipe 21 ft. capacity 10 G.P.M.
Type: ☐ Submersible ☑ Jet ☐ Reciprocating

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Mich. Dept. of Public Health
MAR 11 1985
Bureau of Environmental and Occupational Health - GWQS

USE A 2ND SHEET IF NECESSARY

16 Remarks, elevation, source of data, etc.

17 WATER WELL CONTRACTOR'S CERTIFICATION:
This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.
FLINT & WALLING 6-3-17-19
REGISTERED BUSINESS NAME REGISTRATION NO.
Address 4794 DIXIE HWY, HIGHLAND, MICH 48
Signed ____ Date 11/15/85
AUTHORIZED REPRESENTATIVE

D67d 100M (Rev. 12-68)

GEOLOGICAL SURVEY COPY

WATER WELL RECORD

ACT 294 PA 1965

MICHIGAN DEPARTMENT OF PUBLIC HEALTH

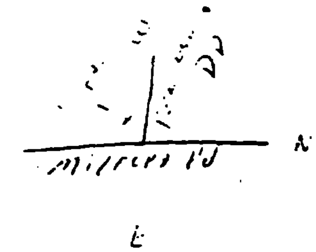
1 LOCATION OF WELL

County	Township Name	Fraction	Section Number	Town Number	Range Number
Oakland	Highland	¼ ¼ ¼	10	[illegible] N/S.	[illegible] E/W.

Distance And Direction from Road Intersections: [illegible]

Street address & City of Well Location:

Locate with "X" in section below — Sketch Map:



2 FORMATION

FORMATION	THICKNESS OF STRATUM	DEPTH TO BOTTOM OF STRATUM
BROWN SAND	0	15
BROWN SAND & CLAY	15	25
WATER SAND & GRAVEL	25	40

USE A 2ND SHEET IF NEEDED

3 OWNER OF WELL: [illegible] CRAFT HOMES, INC.

Address: 259 PENINSULA DR. HIGHLAND, MI 48031

4 WELL DEPTH: (completed) 40 ft. Date of Completion: 6/15/84

5 ☐ Cable tool ☐ Rotary ☐ Driven ☐ Dug ☑ Hollow rod ☑ Jetted ☐ Bored ☐

6 USE: ☑ Domestic ☐ Public Supply ☐ Industry ☐ Irrigation ☐ Air Conditioning ☐ Commercial ☐ Test Well ☐

7 CASING: Threaded ☑ Welded ☐ Diam. 2

2 in. to 37 ft. Depth; ___ in. to ___ ft. Depth

Height: Above/Below Surface 1 ft. Weight 11 lbs./ft. Drive Shoe? Yes ☑ No ☐

8 SCREEN:

Type: Johnson [illegible] Dia.: 1¼

Slot/Gauze 10 Length 36

Set between 37 ft. and 40 ft.

Fittings: BREMER CHECK

9 STATIC WATER LEVEL

12 ft. below land surface

10 PUMPING LEVEL below land surface

15 ft. after 1 hrs. pumping 10 g.p.m.

16 ft. after 2 hrs. pumping 12 g.p.m.

11 WATER QUALITY in Parts Per Million:

Iron (Fe) — Chlorides (Cl) —

Hardness — Other —

12 WELL HEAD COMPLETION: ☐ In Approved Pit ☑ Pitless Adapter ☑ 12" Above Grade

13 Well Grouted? ☐ Yes ☑ No ☐ Neat Cement ☐ Bentonite ☐

Depth: From ___ ft. to ___ ft.

14 Nearest Source of possible contamination

55 feet S Direction SEPTIC Type

Well disinfected upon completion ☑ Yes ☐ No

15 PUMP: ☐ Not installed

Manufacturer's Name F & W

Model Number C1305S HP ½ Volts 115

Length of Drop Pipe 21 ft. capacity 16 G.P.M.

Type: ☐ Submersible ☑ Jet ☐ Reciprocating

16 Remarks, elevation, source of data, etc.

RECEIVED
Mich. Dept. of Public Health
MAR 1 1 1985
Bureau of Environmental and Occupational Health - GWQS

17 WATER WELL CONTRACTOR'S CERTIFICATION:

This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

[illegible] Well Drilling — REGISTERED BUSINESS NAME; 63-1749 — REGISTRATION NO.

Address 4794 DUCK LK RD HIGHLAND, MI.

Signed [signature] AUTHORIZED REPRESENTATIVE Date 6/15/84

D67d 100M (Rev. 12-68)

GEOLOGICAL SURVEY COPY

WATER WELL AND PUMP RECORD

PART 127 ACT 368, P.A. 1978

PERMIT NUMBER

1 LOCATION OF WELL

County	Township Name	Fraction	Section Number	Town Number	Range Number
Oak	Highland	SE¼ SW¼ SW¼	10	3 N/S	7 E/W

Distance And Direction From Road Intersection

Street Address & City of Well Location

Locate with "X" in Section Below

[redacted]

3 OWNER OF WELL

Address

Address Same As Well Location? ☑ Yes ☐ No

4 WELL DEPTH (completed) 32 ft — Date of Completion 5-9-84

5 ☐ Cable tool ☐ Rotary ☐ Driven ☐ Dug ☑ Hollow rod ☐ Auger ☐ Jetted ☐

6 USE ☑ Domestic ☐ Type I Public ☐ Type III Public ☐ Irrigation ☐ Type IIa Public ☐ Heat pump ☐ Test Well ☐ Type IIb Public ☐

7 CASING Diameter ☑ Steel ☑ Threaded ☐ Plastic ☐ Welded

2 in. to 32 ft. depth
___ in. to ___ ft. depth
Grouted Drill Hole Diameter ___ in. to ___ ft. depth; ___ in. to ___ ft. depth

Height: Above/Below Surface 1 ft; Weight 3.5 lbs/ft; Drive Shoe ☑ Yes ☐ No

2 FORMATION DESCRIPTION

FORMATION DESCRIPTION	THICKNESS OF STRATUM	DEPTH TO BOTTOM OF STRATUM
Clay	10	10
Sand & gravel	15	25
Br gravel	7	32

USE A 2ND SHEET IF NEEDED

8 SCREEN ☐ Not installed

Type Stainless Diameter 1¼
Slot/Gauze 15 Length 3'
Set between 29 ft. and 32 ft.
FITTINGS ☐ K-Packer ☐ Lead Packer ☑ Bremer Check ☑ Blank above screen 1 ft Other

9 STATIC WATER LEVEL 15 ft. below land surface ☐ Flow

10 PUMPING LEVEL below land surface
20 ft. after 1 hrs. pumping at 10 G.P.M.
___ ft. after ___ hrs. pumping at ___ G.P.M.

11 WELL HEAD COMPLETION ☑ Pitless adapter ☑ 12" above grade ☐ Basement offset ☐ Approved pit

12 WELL GROUTED? ☑ No ☐ Yes From ___ to ___ ft.
☐ Neat cement ☐ Bentonite ☐ Other
No. of bags of cement ___ Additives ___

13 Nearest source of possible contamination
Type Septic Distance 50 ft Direction S
Well disinfected upon completion? ☑ Yes ☐ No

14 PUMP ☑ Not installed ☐ Pump installation Only
Manufacturer's name
Model number ___ HP ___ Volts
Length of Drop Pipe ___ ft. capacity ___ G.P.M.
TYPE ☐ Submersible ☐ Jet
PRESSURE TANK
Manufacturer's name
Model number ___ Capacity ___ Gallons

JUN 23 1984

RECEIVED

JUL 3 1 1984

Bureau of ... and Occupational Health GWQS

15 Remarks, elevation, source of data, etc.
ADDED INFO BY DRILLER, ITEM NO.
*CORRECTED BY
**ADDITION BY
ELEVATION
DEPTH TO ROCK

16. WATER WELL CONTRACTOR'S CERTIFICATION
This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

Ernest C Morris Inc — 63-1154
REGISTERED BUSINESS NAME — REGISTRATION NO.
Address 840 N. Tulcomile
Signed [signature] Date 5-18-84
AUTHORIZED REPRESENTATIVE

D67a (Rev. 10 80)

GEOLOGICAL SURVEY COPY

GEOLOGICAL SURVEY SAMPLE NO.

WATER WELL RECORD

ACT 294 PA 1965

MICHIGAN DEPARTMENT OF PUBLIC HEALTH

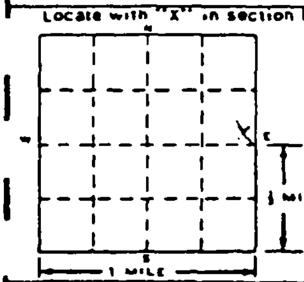
1 LOCATION OF WELL

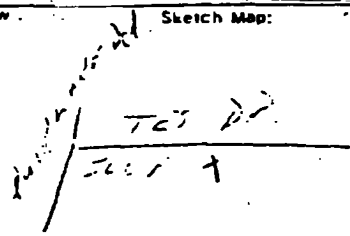
County	Township Name	Fraction	Section Number	Town Number	Range Number
[illegible]	[illegible]	[illegible] ¼ ¼	12	T. [illegible] N/S.	[illegible] E/W.

Distance And Direction from Road Intersection: [illegible]

Street address & City of Well Location: [illegible]

Locate with "X" in section below. Sketch Map:





3 OWNER OF WELL: [illegible]

Address [illegible]

4 WELL DEPTH: (completed) 170 ft. Date of Completion

5

☐ Cable tool ☐ Rotary ☒ Driven ☐ Dug
☒ Hollow rod ☐ Jetted ☐ Bored ☐ ____

6 USE:

☒ Domestic ☐ Public Supply ☐ Industry
☐ Irrigation ☐ Air Conditioning ☐ Commercial
☐ Test Well ☐

7 CASING: Threaded ☒ Welded ☐

Diam. 2 in. to 67 ft. Depth
____ in. to ____ ft. Depth

Height: Above/Below Surface 1 ft.
Weight ____ lbs./ft.
Drive Shoe? Yes ☐ No ☒

2 FORMATION

FORMATION	THICKNESS OF STRATUM	DEPTH TO BOTTOM OF STRATUM
Sand - Clay, water	6	6
Sand & gravel Clay	6	15
Blue Clay	15	60
Sand - gravel [illegible]	60	70

OCT 14 1969

RECEIVED
MICH. DEPT. OF PUBLIC HEALTH
OCT 17 1969

USE A 2ND SHEET IF NEEDED

8 SCREEN:

Type: [illegible] Dia.: 1¼
Slot/Gauze 10 Length 3
Set between 67 ft. and 70 ft.
Fittings: [illegible]

9 STATIC WATER LEVEL

10 ft. below land surface

10 PUMPING LEVEL below land surface

[illegible] ft. after 1 hrs. pumping 15 g.p.m.
[illegible] ft. after 12 hrs. pumping 15 g.p.m.

11 WATER QUALITY in Parts Per Million:

Iron (Fe) — Chlorides (Cl) —
Hardness ____ Other ____

12 WELL HEAD COMPLETION:

☐ In Approved Pit
☐ Pitless Adapter ☐ 12" Above Grade

13 Well Grouted? ☐ Yes ☒ No

☐ Neat Cement ☐ Bentonite ☐ ____
Depth: From ____ ft. to ____ ft.

14 Nearest Source of possible contamination

60 feet N Direction Septic Type
Well disinfected upon completion ☒ Yes ☐ No

15 PUMP:

☒ Not installed
Manufacturer's Name ____
Model Number ____ HP ____ Volts ____
Length of Drop Pipe ____ ft. capacity ____ G.P.M.
Type: ☐ Submersible
☐ Jet ☐ Reciprocating

16 Remarks, elevation, source of data, etc.

17 WATER WELL CONTRACTOR'S CERTIFICATION:

This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

[illegible] 174
REGISTERED BUSINESS NAME REGISTRATION NO.

Address [illegible]

Signed [illegible] Date [illegible]
AUTHORIZED REPRESENTATIVE

067d 100M (Rev. 12-68)

GEOLOGICAL SURVEY COPY

WATER WELL RECORD
ACT 294 PA 1965

MICHIGAN DEPARTMENT OF PUBLIC HEALTH

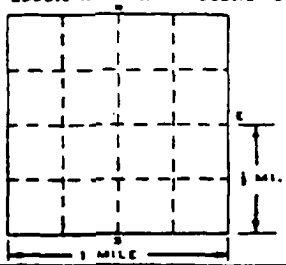
1 LOCATION OF WELL

County	Township Name	Fraction	Section Number	Town Number	Range Number
[illegible]	[illegible]	[illegible]	12	3 N/S.	7 E/W.

Distance And Direction from Road Intersections

Street address & City of Well Location

Locate with "X" in section below — Sketch Map:



3 OWNER OF WELL:

Address

4 WELL DEPTH: (completed) Date of Completion 40 ft. 1-5-66

5 ☐ Cable tool ☐ Rotary ☐ Driven ☐ Dug ☐ Hollow rod ☒ Jetted ☐ Bored ☐ ____

6 USE: ☒ Domestic ☐ Public Supply ☐ Industry ☐ Irrigation ☐ Air Conditioning ☐ Commercial ☐ Test Well ☐ ____

7 CASING: Threaded ☒ Welded ☐ Diam. 2 in. to ____ ft. Depth; ____ in. to ____ ft. Depth

Height: Above/Below Surface ____ ft. Weight ____ lbs./ft. Drive Shoe? Yes ☒ No ☐

2 FORMATION	THICKNESS OF STRATUM	DEPTH TO BOTTOM OF STRATUM
[illegible]	21	21
[illegible]	16	37
[illegible]	7	44

8 SCREEN:
Type: [illegible] Dia.: 1¼
Slot/Gauge 10 Length 2'6"
Set between 41 ft. and 44 ft.
Fittings: [illegible]

9 STATIC WATER LEVEL
15 ft. below land surface

10 PUMPING LEVEL below land surface
15 ft. after ½ hrs. pumping 10 g.p.m.
15 ft. after ½ hrs. pumping 10 g.p.m.

11 WATER QUALITY in Parts Per Million:
Iron (Fe) ____ Chlorides (Cl) ____
Hardness ____ Other ____

12 WELL HEAD COMPLETION: ☐ In Approved Pit ☐ Pitless Adapter ☒ 12" Above Grade

13 Well Grouted? ☐ Yes ☐ No ☐ Neat Cement ☐ Bentonite ☐ ____
Depth: From ____ ft. to ____ ft.

14 Nearest Source of possible contamination
[illegible] feet [illegible] Direction [illegible] Type
Well disinfected upon completion ☒ Yes ☐ No

15 PUMP: ☐ Not installed
Manufacturer's Name [illegible]
Model Number [illegible] HP ½ Volts [illegible]
Length of Drop Pipe [illegible] ft. capacity [illegible] G.P.M.
Type: ☐ Submersible ☒ Jet ☐ Reciprocating

USE A 2ND SHEET IF NEEDED

16 Remarks, elevation, source of data, etc.

17 WATER WELL CONTRACTOR'S CERTIFICATION:
This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

REGISTERED BUSINESS NAME ____ REGISTRATION NO. ____

Address ____

Signed ____ Date ____
AUTHORIZED REPRESENTATIVE

D67d 100M (Rev. 12-68)

GEOLOGICAL SURVEY COPY

GEOLOGICAL SURVEY NO

W. 'ER WELL AND PUMP RECC)

PERMIT NUMBER

1 LOCATION OF WELL

County	Township Name	Fraction	Section Number	Town Number	Range Number
Oakland	Highland	nw. se. ne.	12	3 N/S	7 E/W

Distance And Direction From Road Intersection

Street Address & City of Well Location

Locate with "X" in Section Below — X

Sketch Map

3 OWNER OF WELL

Address

Address Same As Well Location?

4 WELL DEPTH (completed) 95 ft — Date of Completion 10-6-84

5 [X] Cable tool [ ] Rotary [ ] Driven [ ] Dug [ ] Hollow rod [ ] Auger [ ] Jetted [ ]

6 USE [X] Domestic [ ] Type I Public [ ] Type III Public [ ] Irrigation [ ] Type IIa Public [ ] Heat pump [ ] Test Well [ ] Type IIb Public [ ]

2 FORMATION DESCRIPTION

FORMATION DESCRIPTION	THICKNESS OF STRATUM	DEPTH TO BOTTOM OF STRATUM
Brown clay-blue clay		45
Blue clay-sand	42	87
Med. sand & water	8	95

USE A 2ND SHEET IF NEEDED

7 CASING Diameter 4 in. to 91 ft. depth; [X] Steel [ ] Threaded [ ] Plastic [X] Welded; ___ in. to ___ ft. depth

Height: Above Surface 1 ft. Weight 10.40 lbs./ft

Grouted Drill Hole Diameter ___ in. to ___ ft. depth; ___ in. to ___ ft. depth

Drive Shoe [X] Yes [ ] No

8 SCREEN [ ] Not Installed

Type Johnson Diameter 3"

Slot 12 Length 48"

Set between 91 ft. and 95 ft.

FITTINGS [X] K-Packer [ ] Lead Packer [ ] Bremer Check [ ] Blank above screen ___ ft. Other 1'nipple

9 STATIC WATER LEVEL 20 ft. below land surface [ ] Flow

10 PUMPING LEVEL: below land surface

42 ft. after 2 hrs. pumping at 60 G.P.M.

___ ft. after ___ hrs. pumping at ___ G.P.M.

11 WELL HEAD COMPLETION [X] Pitless adapter [ ] 12" above grade [ ] Basement offset [ ] Approved pit

12 WELL GROUTED? [X] No [ ] Yes From ___ to ___ ft.

[ ] Neat cement [ ] Bentonite [ ] Other

No. of bags of cement ___ Additives ___

13 Nearest source of possible contamination

Type septic Distance 55 ft. Direction NE

Well disinfected upon completion? [X] Yes [ ] No

14 PUMP [ ] Not Installed [ ] Pump Installation Only

Manufacturer's name Red Jacket

Model number ___ HP ½ Volts 220

Length of Drop Pipe 42 ft. capacity 10 G.P.M.

TYPE [X] Submersible [ ] Jet

PRESSURE TANK

Manufacturer's name

Model number WX203 Capacity ___ Gallons

15 Remarks, elevation, source of data, etc.

16 WATER WELL CONTRACTOR'S CERTIFICATION:

This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief

Pettig Well Drilling — 0413

REGISTERED BUSINESS NAME — REGISTRATION NO.

Address 5575 Jackson Blvd. Davisburg

Signed [signature] Pres. — AUTHORIZED REPRESENTATIVE — Date 5-13-85

D67d 2/84

Authority: Act 368 PA 1978
Completion: Required
Penalty: Conviction of a violation of any provision is a

GEOLOGICAL SURVEY COPY

GEOLOGICAL SURVEY NO.

WATER WELL AND PUMP RECORD

PART 127 ACT 368 P.A. 1978

PERMIT NUMBER

1 LOCATION OF WELL

County	Township Name	Fraction	Town Number	Range Number
Oakland	Highland	nw ¼ ne¼ se¼ [redacted]	3 N/S	7 E/W

[redacted] Intersection

Street Address & City of Well Location

Locate with "X" in Section Below

Sketch Map

1 MILE

2 FORMATION DESCRIPTION

FORMATION DESCRIPTION	THICKNESS OF STRATUM	DEPTH TO BOTTOM OF STRATUM
Set pipe in sand Drove	21	21
Fine sand	17	38
Water sand	4	42

ADDED INFO BY DRILLER, ITEM NO.
CORRECTED BY
CONDITION BY
ELEVATION
DEPTH TO ROCK

USE ADDITIONAL SHEET IF NEEDED

15 Remarks, elevation, source of data, etc

JUN 31 1983

Address [redacted]

Address Same As Well Location? ☒ Yes ☐ No

4 WELL DEPTH (completed) 42 ft | Date of Completion 8-10-82

5 ☐ Cable tool ☐ Rotary ☐ Driven ☐ Dug ☒ Hollow rod ☐ Auger ☐ Jetted ☐ _____

6 USE ☒ Domestic ☐ Type I Public ☐ Type III Public ☐ Irrigation ☐ Type IIa Public ☐ Heat pump ☐ Test Well ☐ Type IIb Public ☐ _____

7 CASING Diameter ☒ Steel ☒ Threaded ☐ Plastic ☐ Welded
4 in to 38 ft depth
_____ in to _____ ft depth
Grouted Drill Hole Diameter
_____ in to _____ ft depth
_____ in to _____ ft depth
Height Above/Below Surface _____ ft
Weight _____ lbs /ft
Drive Shoe ☐ Yes ☐ No

8 SCREEN ☐ Not Installed
Type S.S. Diameter 3"
Slot 10 Length 4 ft.
Set between 38 ft and 42 ft
FITTINGS ☒ K-Packer ☐ Lead Packer ☐ Bremer Check
☒ Blank above screen 1 ft Other _____

9 STATIC WATER LEVEL
15 ft below land surface ☐ Flow

10 PUMPING LEVEL below land surface
38 ft after 2 hrs pumping at 50 G P M
_____ ft after _____ hrs. pumping at _____ G P M

11 WELL HEAD COMPLETION ☒ Pitless adapter ☐ 12" above grade ☐ Basement offset ☐ Approved pit

12 WELL GROUTED? ☐ No ☐ Yes From _____ to _____ ft
☐ Neat cement ☐ Bentonite ☐ Other _____
No. of bags of cement _____ Additives _____

13 Nearest source of possible contamination
Type Septic Distance 50 ft Direction n.
Well disinfected upon completion? ☒ Yes ☐ No

14 PUMP ☐ Not Installed ☐ Pump Installation Only
Manufacturer's name Goulds
Model number _____ HP 3/4 Volts 230
Length of Drop Pipe 30 ft Capacity 12 G P M
TYPE ☒ Submersible ☐ Jet _____
PRESSURE TANK
Manufacturer's name _____
Model number _____ Capacity _____ Gallons

16 WATER WELL CONTRACTOR'S CERTIFICATION

This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief

Frank Kersenty Well Drilling 63-1741
REGISTERED BUSINESS NAME REGISTRATION NO

Address 2610 W. Meadow Dr. Davisburg, Mi.

Signed Frank Kersenty Date 1-27-83
AUTHORIZED REPRESENTATIVE

D67d (Rev 10-80)

MAY 10 1984

WATER WELL AND PUMP RECORD

PERMIT NUMBER

1 LOCATION OF WELL

County: Oakland | Township Name: Highland | Fraction: NE¼ SW¼ NW¼ | Section Number: 12 | Town Number: 3 N/S | Range Number: 7 E/W

[redacted]

Street Address or City of Well Location: [redacted]

Locate Well in Section Below

[redacted]

1 MILE

2 OWNER OF WELL

[redacted]

Address Same As Well Location? ☑ Yes ☐ No

4 WELL DEPTH (completed) 35 ft | Date of Completion 11-10-83

5 ☐ Cable tool ☐ Rotary ☐ Driven ☐ Dug ☑ Hollow rod ☐ Auger ☐ Jetted ☐

6 USE ☑ Domestic ☐ Type I Public ☐ Type III Public ☐ Irrigation ☐ Type IIa Public ☐ Heat pump ☐ Test Well ☐ Type IIb Public ☐

7 CASING Diameter ☐ Steel ☐ Threaded ☐ Plastic ☐ Welded

2 in. to 32 ft. depth

___ in. to ___ ft. depth

Reduced to ___ in. to ___ ft. depth

___ in. to ___ ft. depth

Height Above/Below Surface 1 ft

Weight 3.22 lbs/ft

Drive Shoe ☐ Yes ☑ No

8 SCREEN ☐ Not Installed

Type SS | Diameter 1¼

Slot Size 10 | Length 3'

Set between 32 ft and 35 ft

FITTINGS ☐ K Packer ☐ Lead Packer ☐ Bremer Check ☐ Gravel above screen ___ ft | Other ___

9 STATIC WATER LEVEL 12 ft below land surface ☐ Flow

10 PUMPING LEVEL below land surface

30 ft after 2 hrs pumping at 12 GPM

___ ft after ___ hrs pumping at ___ GPM

11 WELL HEAD COMPLETION ☑ Pitless adapter ☐ 12" above grade ☐ Basement offset ☐ Approved other

12 WELL GROUTED? ☐ No ☐ Yes From ___ to ___ ft

☐ Neat cement ☐ Bentonite ☐ Other ___

No. of bags of cement ___ Additives ___

13 Nearest source of possible contamination

Type Septic | Distance 50 | Direction N

Well disinfected upon completion? ☑ Yes ☐ No

14 PUMP ☐ Not Installed ☐ Pump tested at ___ GPM

Manufacturer's name Goulds

Model number 3032 | HP 1/2 | Volts 115

Length of Drop Pipe 21 ft | Capacity ___ GPM

Type ☐ Submersible ☑ Jet ___

PRESSURE TANK

Manufacturer's name Well X Trol

Model number 202 | Capacity ___ Gallons

FROM	TO	THICKNESS OF STRATUM	FORMATION DESCRIPTION
	32	32	Set Pipe in Sand Drive
32	35	3	Water Gravel

RECEIVED
Mich. Dept. of Public Health
MAR 20 1984
Bureau of Environmental and Occupational Health GWQS

USE A 2ND SHEET IF NEEDED

15 Remarks elevation source of data etc

WELL INFO BY DRILLER, ITEM NO. ___
CORRECTED BY ___
ADDITION BY ___
ELEVATION ___
TO RIVER ___

16 WATER WELL CONTRACTOR'S CERTIFICATION

This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief

Frank Kenworthy Well Drilling | 63-1241
REGISTERED BUSINESS NAME | REGISTRATION NO

Address 2610 W. Maple Ave Orchard Lake

Signed Frank Kenworthy | Date 2-12-84
AUTHORIZED REPRESENTATIVE

Rev. 11-80

WATER WELL RECORD
ACT 294 PA 1965

MICHIGAN DEPARTMENT OF PUBLIC HEALTH

1 LOCATION OF WELL

County	Township Name	Fraction	Section Number	Town Number	Range Number
Ionia	Keene	SW¼ NE¼ SW¼	16	3 N	7 E

[redacted]

Street address & City of Well Location

Locate with "X" in section below — Sketch Map: [redacted]

1 MILE

2 FORMATION

FORMATION	THICKNESS OF STRATUM	DEPTH TO BOTTOM OF STRATUM
Brown Sand	21	21
Blue Sandy Clay	16	37
Blue Sand Streaks Blue Clay	8	45
Clay Sand Fine	16	61
Clay Sand	11	72

USE A 2ND SHEET IF NEEDED

3 OWNER OF WELL

Address

4 WELL DEPTH: (completed) 72 ft. Date of Completion 9-18-79

5 [X] Cable tool [ ] Rotary [ ] Driven [ ] Dug [ ] Hollow rod [ ] Jetted [ ] Bored [ ] ____

6 USE: [X] Domestic [ ] Public Supply [ ] Industry [ ] Irrigation [ ] Air Conditioning [ ] Commercial [ ] Test Well [ ] ____

7 CASING: Threaded [ ] Welded [X] Height: Above/Below Surface ____ ft.

Diam. 4 in. to 22 ft. Depth; ____ in. to ____ ft. Depth. Weight ____ lbs./ft. Drive Shoe? Yes [X] No [ ]

8 SCREEN:

Type: S S Dia.: 4"

Slot/Gauze 7 Length 4'

Set between 65 ft. and 72 ft.

Fittings: K. Packer

9 STATIC WATER LEVEL 26 ft. below land surface

10 PUMPING LEVEL below land surface

25 ft. after 2 hrs. pumping 11 g.p.m.

____ ft. after ____ hrs. pumping ____ g.p.m.

11 WATER QUALITY in Parts Per Million:

Iron (Fe) ____ Chlorides (Cl) ____

Hardness ____ Other ____

12 WELL HEAD COMPLETION: [ ] In Approved Pit [X] Pitless Adapter [ ] 12" Above Grade

13 Well Grouted? [ ] Yes [ ] No [ ] Neat Cement [ ] Bentonite [ ] ____

Depth: From ____ ft. to ____ ft.

14 Nearest Source of possible contamination

____ feet ____ Direction ____ Type

Well disinfected upon completion [X] Yes [ ] No

15 PUMP: [ ] Not installed

Manufacturer's Name F E W

Model Number ____ HP 1/2 Volts 230

Length of Drop Pipe 25 ft. capacity 11 G.P.M.

Type: [X] Submersible [ ] Jet [ ] Reciprocating

16 Remarks, elevation, source of data, etc.

WELL LOG BY DRILLER, ITEM 12.

SUBMITTED BY

PRODUCTION BY

ELEVATION

DEPTH TO ROCK

17 WATER WELL CONTRACTOR'S CERTIFICATION:

This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

Smith Drilling Co. 1133

REGISTERED BUSINESS NAME — REGISTRATION NO.

Address 2120 Waldron E. Ionia

Signed [signature] Date 6-11-81

AUTHORIZED REPRESENTATIVE

D67d 100M (Rev. 10-68)

GEOLOGICAL SURVEY COPY

WATER WELL AND PUMP RECORD

PART 127, ACT 368, P.A. 1978

PERMIT NUMBER

1 LOCATION OF WELL

County: Oakland | Township Name: Highland | Fraction: NE¼ NW¼ NE¼ | Section Number: 16 | Town Number: 3 N/S | Range Number: 7 E/W

[redacted]

[redacted]

Locate with X in Section Below | Sketch Map

[redacted]

1 MILE

2 FORMATION DESCRIPTION

FORMATION DESCRIPTION	THICKNESS OF STRATUM	DEPTH TO BOTTOM OF STRATUM
Sand & Gravel	35	35'
Blue Clay	30	65
Blue Clay & Gravel (hard Pan)	30	95
Gravel	12	107

4 WELL DEPTH (completed): 107 ft | Date of Completion: MAY 1983

5 ☒ Cable tool ☐ Rotary ☐ Driven ☐ Dug ☐ Hollow rod ☐ Auger ☐ Jetted ☐

6 USE: ☒ Domestic ☐ Type I Public ☐ Type III Public ☐ Irrigation ☐ Type II Public ☐ Heat Pump ☐ Test Well ☐ Type IV Public ☐

7 CASING: Diameter 4 in. to 107 ft. depth | ☒ Steel ☐ Threaded ☐ Plastic ☒ Welded | Height Above Surface 1 ft | Weight 11 lbs. ft | Drive Shoe ☒ Yes ☐ No | Grout Diameter ____ in. to ____ ft. depth; ____ in. to ____ ft. depth

8 SCREEN: ☐ Not installed | Type Stainless | Diameter 4" | Slot 18 | Length 4' | Set between 103 ft. and 107 ft. | ☒ K-Packer ☐ Lead Packer ☐ Bremer Check | ☐ Blank above screen 1 ft. | Other

9 STATIC WATER LEVEL: 35 ft. below land surface ☐ Flow

10 PUMPING LEVEL below land surface: 40 ft. after 1 hrs. pumping at 15+ G.P.M. ____ ft. after ____ hrs. pumping at ____ G.P.M.

11 WELL HEAD COMPLETION: ☒ Pitless adapter ☒ 12" above grade ☐ Basement offset ☐ Approved pit

12 WELL GROUTED? ☒ No ☐ Yes From ____ to ____ ft. ☐ Neat cement ☐ Bentonite ☐ Other ____ | No. of bags of cement ____ Additives ____

13 Nearest source of possible contamination: Type Septic | Distance 50 ft. | Direction S | Well disinfected upon completion? ☒ Yes ☐ No

14 PUMP: ☐ Not installed ☐ Pump manufacturer Only | Manufacturer's name Red Jacket | Model number 9BC2 | HP ½ | Volts 220 | Length of Drop Pipe 63 ft. | Capacity 12 G.P.M. | TYPE ☒ Submersible ☐ Jet | PRESSURE TANK | Manufacturer's name Well-X-Trol | Model number 202 | Capacity 42 Gallons

USE 2ND SHEET IF NECESSARY FOR ADDITIONAL INFORMATION

RECEIVED SEP 5 1983 LAND DIVISION

15 Remarks: elevation, source of data, etc.

ADDED INFO BY DRILLER ITEM NO.
CORRECTED BY
ADDITION BY
ELEVATION

16 WATER WELL CONTRACTOR'S CERTIFICATION

This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

Registered Business Name: [redacted] | Registration No. 1154

Address: [redacted]

Signature: [redacted] Authorized Representative | Date 9-3-83

DEQ-1 Rev. 10-80

JAN 17 1973

WATER WELL RECORD
ACT 294 PA 1965

MICHIGAN DEPARTMENT OF PUBLIC HEALTH

ND

1 LOCATION OF WELL

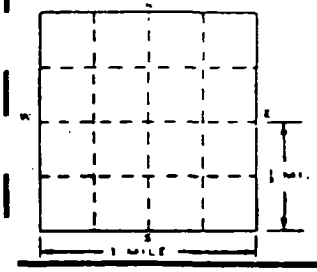
County	Township Name	Location	Section Number	Town Number	Range Number
OAKLAND	HIGHLAND	SW · SW · SW ·	16	3 N/S.	7 E/W.

Distance And Direction From Nearest Town Or Village

Street Address & City of Well Location

Locate with "X" in section from below

Sketch Map:



3 OWNER OF WELL:
Owner
Address

4 WELL DEPTH: (completed) 95 ft. **Date of Completion** 9-22-72

5 ☒ Cable tool ☐ Rotary ☐ Driven ☐ Dug ☐ Hollow rod ☐ Jetted ☐ Bored ☐ ____

6 USE: ☒ Domestic ☐ Public Supply ☐ Industry ☐ Irrigation ☐ Air Conditioning ☐ Commercial ☐ Test Well ☐

7 CASING: Threaded ☒ Welded ☐ **Height: Above/Below Surface** ____ ft.
Diam. 4 in. to 95 ft. Depth **Weight** 11 lbs./ft.
____ in. to ____ ft. Depth **Drive Shoe?** yes ☐ no ☐

8 SCREEN: W/W
Type: Johnson S/S Dia.: 2"
Slot/Gauze 20 Length 4'
Set between 91 ft. and 95 ft.
Fittings: Standard

9 STATIC WATER LEVEL
78 ft. below land surface

10 PUMPING LEVEL below land surface
87 ft. after 1½ hrs. pumping 18 g.p.m.
____ ft. after ____ hrs. pumping ____ g.p.m.

11 WATER QUALITY in Parts Per Million:
Iron (Fe) ____ Chlorides (Cl) ____
Hardness ____ Other ____

12 WELL HEAD COMPLETION: ☐ In Approved Pit ☒ Pitless Adapter ☒ 12" Above Grade

13 Well Grouted? ☐ Yes ☒ No
☐ Neat Cement ☐ Bentonite ☐ ____
Depth: From ____ ft. to ____ ft.

14 Nearest Source of possible contamination
75 feet ____ Direction Septic Type
Well disinfected upon completion ☒ Yes ☐ No

15 PUMP: ☐ Not installed
Manufacturer's Name Red Jacket
Model Number 12BE HP ½ Volts 230
Length of Drop Pipe 72 ft. Capacity 15 G.P.M.
Type: ☒ Submersible ☐ Jet ☐ Reciprocating

2 FORMATION

FORMATION	THICKNESS OF STRATUM	DEPTH TO BOTTOM OF STRATUM
Yellow Sand	42	42
Brown Sand	18	60
Fine Water Sand	25	85
Gravel, Brown - Grayish	11	96

USE A 2ND SHEET IF NEEDED

16 Remarks, elevation, source of data, etc.

34

17 WATER WELL CONTRACTOR'S CERTIFICATION:
This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.
Brown Drilling Co, Inc. 26
REGISTERED BUSINESS NAME REGISTRATION NO.
Address 7215 W M-59 Howell
Signed Gretchen Kirshner Date 10-3-72
AUTHORIZED REPRESENTATIVE
Office Mgr.

GEOLOGICAL SURVEY COPY

MAR 1 ... 1974

WATER WELL RECORD

ACT 294 PA 1965

MICHIGAN DEPARTMENT OF PUBLIC HEALTH

?

SW SW SW

1 LOCATION OF WELL

County	Township Name	Fraction	Section Number	Town Number	Range Number
Oakland	Highland	~~NW S NW~~	16	3 N	7 E

Distance And Direction from Road Intersections: About [redacted]

Street address & City of Well Location:

Locate with "X" in section below: X

Sketch Map: [redacted]

1 MILE

3 OWNER OF WELL: [redacted]

Address: [redacted]

4 WELL DEPTH: (completed) 60 ft. Date of Completion: Apr. 24, '73

5 ☐ Cable tool ☐ Rotary ☐ Driven ☐ Dug ☒ Hollow rod ☒ Jetted ☐ Bored ☐

6 USE: ☒ Domestic ☐ Public Supply ☐ Industry ☐ Irrigation ☐ Air Conditioning ☐ Commercial ☐ Test Well ☐

7 CASING: Threaded ☒ Welded ☐ Diam. 2 in. to 56 ft. Depth; ___ in. to ___ ft. Depth. Height: Above/Below Surface ___ ft. Weight ___ lbs./ft. Drive Shoe? Yes ☐ No ☒

2 FORMATION	THICKNESS OF STRATUM	DEPTH TO BOTTOM OF STRATUM
Red Sand	50'	50'
Gay & Red Sand Mix	10'	60'
"Water"		

QUESTIONABLE LOCATION

USE A 2ND SHEET IF NEEDED

8 SCREEN: Type: Johnson S.S. Dia.: 1¼" Slot/~~Gauze~~ 12 Length 3½' Set between 56 ft. and 60 ft. Fittings: 2" Bremer Check Val.

9 STATIC WATER LEVEL 30 ft. below land surface

10 PUMPING LEVEL below land surface 40 ft. after 2 hrs. pumping 10 g.p.m.; ___ ft. after ___ hrs. pumping ___ g.p.m.

11 WATER QUALITY in Parts Per Million: Iron (Fe) ___ Chlorides (Cl) ___ Hardness ___ Other ___

12 WELL HEAD COMPLETION: ☐ In Approved Pit ☐ Pitless Adapter ☒ 12" Above Grade

13 Well Grouted? ☐ Yes ☒ No ☐ Neat Cement ☐ Bentonite ☐ ___ Depth: From ___ ft. to ___ ft.

14 Nearest Source of possible contamination 60 feet N. Direction Septic & F. Type. Well disinfected upon completion ☒ Yes ☐ No

15 PUMP: ☒ Not installed. Manufacturer's Name ___ Model Number ___ HP ___ Volts ___ Length of Drop Pipe ___ ft. capacity ___ G.P.M. Type: ☐ Submersible ☐ Jet ☐ Reciprocating

16 Remarks, elevation, source of data, etc.

ACCEPTED BY DRILLER, ITEM NO.
... BY
... BY
ELEVATION
DEPTH TO ROCK

17 WATER WELL CONTRACTOR'S CERTIFICATION:
This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

WOODCUM Well Drilling Co. - 0835
REGISTERED BUSINESS NAME — REGISTRATION NO.

Address: 57 W. Beverly St. Pont. Mi.

Signed: Robert I. Woodcum — AUTHORIZED REPRESENTATIVE — Date 2-21-74

D67d 100M (Rev. 12-68)

ACT 294 PA 1965

OF PUBLIC HEALTH

LOCATION OF WELL

County	T-p.	Fraction	Section No.	Town	Range
Oakland	Highland	SE ¼ SW ¼ SW ¼	16	3 N	7 E

Distance And Direction from Road Intersection

OWNER No.

3 OWNER OF WELL

Address

Street address & City of Well Location

FORMATION	THICKNESS OF STRATUM	DEPTH TO BOTTOM OF STRATUM
Dry Yellow sand	79	79
Sand & clay	6	85
Clay	6	91
Coarse water sand	7	98
Fine water sand	5	103
Coarse water sand	7	110

4 WELL DEPTH: (completed) 110 ft. Date of Completion 6-17-69

5 ☒ Cable tool ☐ Rotary ☐ Driven ☐ Dug ☐ Hollow rod ☐ Jetted ☐ Bored ☐ ___

6 USE: ☒ Domestic ☐ Public Supply ☐ Industry ☐ Irrigation ☐ Air Conditioning ☐ Commercial ☐ Test Well ☐ ___

7 CASING: Diam. Threaded ☐ Welded ☐
4 in. to ___ ft. Depth
___ in. to ___ ft. Depth
Height: Above/Below surface ___ ft.
Weight 11 lbs/ft.
Drive Shoe? Yes ☒ No ☐

8 SCREEN
Type: Stainless Dia.: 4"
Slot/Gauge 30 Length 4'
Set between 106 ft. and 110 ft.
Fittings: Std. w/ burlap packer

9 STATIC WATER LEVEL
65 ft. below land surface

10 PUMPING LEVEL below land surface
75 ft. after 2 hrs. pumping 30 g.p.m.
___ ft. after ___ hrs. pumping ___ g.p.m.

11 WATER QUALITY in Parts Per Million:
Iron (Fe) ___ Chlorides (Cl) ___
Hardness ___

12 WELL HEAD COMPLETION: ☐ In Approved Pit ☐ Pitless Adapter ☐ 12" Above Grade

13 GROUTING:
Well Grouted? ☐ Yes ☒ No
Material: ☐ Neat Cement ☐ ___
Depth: From ___ ft. to ___ ft.

14 SANITARY:
Nearest Source of possible contamination
60 feet W Direction Septic Type
Well disinfected upon completion ☒ Yes ☐ No

15 PUMP:
Manufacturer's Name ___
Model Number ___ HP ___
Length of Drop Pipe ___ ft. capacity ___ G.P.M.
Type: ☐ Submersible ☐ ___ ☐ Jet ☐ Reciprocating

16 Remarks, elevation, source of data, etc.

ADDED INFO. BY DRILLER, ITEM 16.

CORRECTED BY:

ADDITION BY:

17 WATER WELL CONTRACTOR'S CERTIFICATION:
This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

John Cameron & Son — REGISTERED BUSINESS NAME
0414 — REGISTRATION NO.

Address 1800 Butterfield Rd., Troy

Signed [signature] — AUTHORIZED REPRESENTATIVE
Date 1-24-70

7D 100M 6-66

GEOLOGICAL SURVEY COPY

2-

OCT 14 11

WATER WELL RECORD

ACT 294 PA 1965

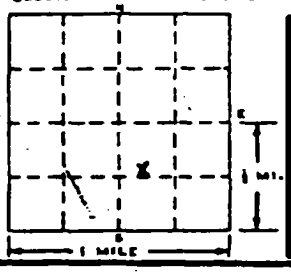
MICHIGAN DEPARTMENT OF PUBLIC HEALTH

1 LOCATION OF WELL

County	Township Name	Fraction	Section Number	Town Number	Range Number
OAKLAND	HIGHLAND	SW¼ NW¼ SE¼	28	3 N/W.	7 E/W.

Distance And Direction from Road Intersections [redacted]

Locate with "X" in section below



Sketch Map: [redacted]

3 OWNER OF WELL:

Address

4 WELL DEPTH: (completed) 134 ft. Date of Completion NOV 79

5 ☐ Cable tool ☑ Rotary ☐ Driven ☐ Dug ☐ Hollow rod ☐ Jetted ☐ Bored ☐ ____

6 USE: ☑ Domestic ☐ Public Supply ☐ Industry ☐ Irrigation ☐ Air Conditioning ☐ Commercial ☐ Test Well ☐ ____

7 CASING: Threaded ☑ Welded ☐ Diam. 4 in. to 130 ft. Depth; ____ in. to ____ ft. Depth. Height: Above/~~Below~~ Surface 1 ft. Weight 11 lbs./ft. Drive Shoe? Yes ☑ No ☐

2 FORMATION	THICKNESS OF STRATUM	DEPTH TO BOTTOM OF STRATUM
SAND	30	30
CLAY	95	125
SAND	11	136

8 SCREEN: Type: JOHNSON STAINLESS Dia.: 4" Slot/Gauge 15 Length 4' Set between 130 ft. and 134 ft. Fittings: K-PACK 1' BLANK

9 STATIC WATER LEVEL 30 ft. below land surface

10 PUMPING LEVEL below land surface ____ ft. after ___ hrs. pumping 30 g.p.m. ____ ft. after ___ hrs. pumping ____ g.p.m.

11 WATER QUALITY in Parts Per Million: Iron (Fe) ____ Chlorides (Cl) ____ Hardness ____ Other ____

12 WELL HEAD COMPLETION: ☐ In Approved Pit ☑ Pitless Adapter ☑ 12" Above Grade

13 Well Grouted? ☑ Yes ☐ No ☐ Neat Cement ☑ Bentonite ☐ ____ Depth: From ____ ft. to ____ ft.

14 Nearest Source of possible contamination 60 feet WEST Direction SEPTIC TANK Well disinfected upon completion ☑ Yes ☐ No

15 PUMP: ☐ Not installed Manufacturer's Name F + W Model Number 2 WIRE HP ½ Volts 230 Length of Drop Pipe 42 ft. capacity 10 G.P.M. Type: ☒ Submersible ☐ Jet ☐ Reciprocating

OCT 1 1981

USE A 2ND SHEET IF NEEDED

16 Remarks, elevation, source of data, etc.

WELL IN FRONT YARD

ADDED INFO. BY DRILLER, ITEM #4.

CORRECTED BY dlv

17 WATER WELL CONTRACTOR'S CERTIFICATION:

This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

AIRDS PUMP AND WELL SERVICE 1584
REGISTERED BUSINESS NAME REGISTRATION NO.

Address 5635 Cooley Lk Rd, PONTIAC

Signed Donald Aird Date Sept 26, 81
AUTHORIZED REPRESENTATIVE

D67d 100M (Rev. [illegible]) EDITION

GEOLOGICAL SURVEY COPY

MAY 27 1981

WATER WELL RECORD

ACT 294 PA 1965

MICHIGAN DEPARTMENT OF PUBLIC HEALTH

1 LOCATION OF WELL

County	Township Name	Fraction	Section Number	Town Number	Range Number
Oakland	Highland	SW¼ SE¼ SW¼	28	3 N/S.	7 E/W.

Distance And Direction from Road Intersections

Street address & City of Well Location

Locate with "X" in section below — Sketch Map:

3 OWNER OF WELL:

Address

4 WELL DEPTH: (completed) 94 ft. Date of Completion 12-23-80

5

- [x] Cable tool
- [ ] Rotary
- [ ] Driven
- [ ] Dug
- [ ] Hollow rod
- [ ] Jetted
- [ ] Bored
- [ ] ______

6 USE:

- [x] Domestic
- [ ] Public Supply
- [ ] Industry
- [ ] Irrigation
- [ ] Air Conditioning
- [ ] Commercial
- [ ] Test Well
- [ ] ______

7 CASING:

Threaded [x] Welded [ ]

Diam. 4 in. to 90 ft. Depth; ____ in. to ____ ft. Depth

Height: Above/Below Surface 5 ft.

Weight 11 lbs./ft.

Drive Shoe? Yes [x] No [ ]

2 FORMATION

FORMATION	THICKNESS OF STRATUM	DEPTH TO BOTTOM OF STRATUM
Hard Br Clay and rocks	22	22
Brown Clay & Gravel	13	35
Br Cemented Sand & Gravel	35	60
Gray Clay	12	72
Cemented Brown Sand & Gravel	6	78
Fine to Med. Grey Water Sand	16	94

USE A 2ND SHEET IF NEEDED

8 SCREEN: Johnson

Type: s/s w/w Dia.: 4"

Slot/Gauze 12 Length 4'

Set between 90 ft. and 94 ft.

Fittings: Standard

9 STATIC WATER LEVEL

50 ft. below land surface

10 PUMPING LEVEL below land surface

69 ft. after 2 hrs. pumping 25 g.p.m.

____ ft. after ____ hrs. pumping ____ g.p.m.

11 WATER QUALITY in Parts Per Million:

Iron (Fe) ____ Chlorides (Cl) ____

Hardness ____ Other ____

12 WELL HEAD COMPLETION:

- [ ] In Approved Pit
- [x] Pitless Adapter
- [ ] 12" Above Grade

13 Well Grouted? [ ] Yes [ ] No

[ ] Neat Cement [ ] Bentonite [ ] ____

Depth: From ____ ft. to ____ ft.

14 Nearest Source of possible contamination

75 feet ____ Direction septic Type

Well disinfected upon completion [x] Yes [ ] No

15 PUMP:

[ ] Not installed

Manufacturer's Name Tait

Model Number 5-st-210 HP ½ Volts 230

Length of Drop Pipe 75 ft. capacity ____ G.P.M.

Type: [x] Submersible [ ] Jet [ ] Reciprocating

RECEIVED MAY 27 1981 — Livingston County Health Department

16 Remarks, elevation, source of data, etc.

SOURCE DATA BY DRILLER, ITEM NO.
CORRECTED BY
LOCATION BY dlc
ELEVATION
DEPTH TO ROCK

17 WATER WELL CONTRACTOR'S CERTIFICATION:

This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

Drilling Co. Inc. — REGISTERED BUSINESS NAME — REGISTRATION NO.

Address Howell

Signed [signature] AUTHORIZED REPRESENTATIVE Date

GEOLOGICAL SURVEY COPY

JUL 1 0 1980

WATER WELL RECORD
ACT 294 PA 1965

MICHIGAN DEPARTMENT OF PUBLIC HEALTH

1 LOCATION OF WELL

County	Township Name	Fraction	Section Number	Town Number	Range Number
Oakland	Highland	N½ N½ BE½	23	3 N/S	7 E/W

Distance And Direction
[redacted]
Street Address & City of Well Location

Locate with "X" in section below

[redacted]

1 MILE

3 OWNER OF WELL:
Address

4 WELL DEPTH: (completed) 110 ft. Date of Completion Sept 11, 74

5 ☑ Cable tool ☐ Rotary ☐ Driven ☐ Dug ☐ Hollow rod ☐ Jetted ☐ Bored ☐

6 USE: ☑ Domestic ☐ Public Supply ☐ Industry ☐ Irrigation ☐ Air Conditioning ☐ Commercial ☐ Test Well ☐

7 CASING: Threaded ☐ Welded ☑ Diam. 4 in. to 102 ft. Depth; __ in. to __ ft. Depth. Height: Above/Below Surface 1 ft. Weight 10.2 lbs./ft. Drive Shoe? Yes ☑ No ☐

8 SCREEN: Type: Stainless Dia.: 4" Slot/Gauze 12 Length 3 Set between 102 ft. and 110 ft. Fittings: K Packer 12" Nipple Plug

9 STATIC WATER LEVEL 20 ft. below land surface

10 PUMPING LEVEL below land surface 25 ft. after 1 hrs. pumping 30 g.p.m.; __ ft. after __ hrs. pumping __ g.p.m.

11 WATER QUALITY in Parts Per Million: Iron (Fe) __ Chlorides (Cl) __ Hardness __ Other __

12 WELL HEAD COMPLETION: ☐ In Approved Pit ☑ Pitless Adapter ☐ 12" Above Grade

13 Well Grouted? ☐ Yes ☑ No ☐ Neat Cement ☐ Bentonite ☐ Depth: From __ ft. to __ ft.

14 Nearest Source of possible contamination 58 feet W Direction Septic Type. Well disinfected upon completion ☑ Yes ☐ No

15 PUMP: ☐ Not installed. Manufacturer's Name __ Model Number __ HP __ Volts __ Length of Drop Pipe __ ft. capacity __ G.P.M. Type: ☐ Submersible ☐ Jet ☐ Reciprocating

2

FORMATION	THICKNESS OF STRATUM	DEPTH TO BOTTOM OF STRATUM
yellow sand Gravel	40	40
blue clay	30	70
Putty sand	30	100
Course sand	10	110

USE A 2ND SHEET IF NEEDED

JUL 2 1980

16 Remarks, elevation, source of data, etc.
ADDED ...
CORRECTED ...
ADDITION ...
ELEVATION
DEPTH TO ROCK

17 WATER WELL CONTRACTOR'S CERTIFICATION:
This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.
B W Lay ... Sons 0406
REGISTERED BUSINESS NAME REGISTRATION NO.
Address Keego Harbor
Signed [signature] AUTHORIZED REPRESENTATIVE Date Sept 11 74

367d 100M (Rev. 12-68)

GEOLOGICAL SURVEY COPY

MAR 29 (28)

WATER WELL RECORD

ACT 294 PA 1965

MICHIGAN DEPARTMENT OF PUBLIC HEALTH

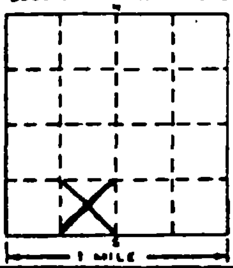
1 LOCATION OF WELL

County	Township Name	Fraction	Section Number	Town Number	Range Number
Oakland	Highland	SE ¼ NE ¼ SW ¼	28	3 N/S.	7 E/W.

Distance And Direction from Road Intersections

Street address & City of Well Location

Locate with "X" in section below



Sketch Map:

[redacted]

3 OWNER OF WELL:

Address

4 WELL DEPTH: (completed) 55 ft. Date of Completion 12-18-72

5
- [x] Cable tool
- [ ] Rotary
- [ ] Driven
- [ ] Dug
- [ ] Hollow rod
- [ ] Jetted
- [ ] Bored
- [ ] ______

6 USE:
- [x] Domestic
- [ ] Public Supply
- [ ] Industry
- [ ] Irrigation
- [ ] Air Conditioning
- [ ] Commercial
- [ ] Test Well
- [ ] ______

7 CASING:
Threaded [x] Welded [ ]

Diam. 4 in. to 51 ft. Depth

____ in. to ____ ft. Depth

Height: Above/Below Surface 1 ft.

Weight 11 lbs./ft.

Drive Shoe? Yes [x] No [ ]

2 FORMATION

FORMATION	THICKNESS OF STRATUM	DEPTH TO BOTTOM OF STRATUM
Gravel	30	30
Clay and Sand	15	45
Clay	5	50
Water Sand	5	55

USE A 2ND SHEET IF NEEDED

8 SCREEN:

Type: PVC Dia.: 3"

Slot/Gauze .018 Length 5'

Set between 51 ft. and 55 ft.

Fittings: K-Packer

9 STATIC WATER LEVEL

20 ft. below land surface

10 PUMPING LEVEL below land surface

40 ft. after 4 hrs. pumping 15 g.p.m.

____ ft. after ____ hrs. pumping ____ g.p.m.

11 WATER QUALITY in Parts Per Million:

Iron (Fe) ____ Chlorides (Cl) ____

Hardness ____ Other ____

12 WELL HEAD COMPLETION:
- [ ] In Approved Pit
- [x] Pitless Adapter
- [ ] 12" Above Grade

13 Well Grouted? [ ] Yes [x] No
- [ ] Neat Cement
- [ ] Bentonite
- [ ] ______

Depth: From ____ ft. to ____ ft.

14 Nearest Source of possible contamination

70 feet W Direction Septic Type

Well disinfected upon completion [x] Yes [ ] No

15 PUMP:
- [ ] Not installed

Manufacturer's Name ~~F&M~~ F & W

Model Number SBA8 HP ½ Volts 230

Length of Drop Pipe 40 ft. capacity 10 G.P.M.

Type:
- [x] Submersible
- [ ] Jet
- [ ] Reciprocating

16 Remarks, elevation, source of data, etc.

ADDED INFO. BY DRILLER, ITEM No.

CORRECTED BY

ADDITION BY

2/80 3/1025'

17 WATER WELL CONTRACTOR'S CERTIFICATION:

This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

Wheeler Bros Inc 1178

REGISTERED BUSINESS NAME REGISTRATION NO.

Address 4440 Jackson Davisburg

Signed Randall E. Wheeler Date 12-18-72

AUTHORIZED REPRESENTATIVE

D67d 100M (Rev. 12-68)

OCT 5 1972

(12)

WATER WELL RECORD

ACT 294 PA 1965

MICHIGAN DEPARTMENT OF PUBLIC HEALTH

1 LOCATION OF WELL

County	Township Name	Fraction	Section Number	Town Number	Range Number
OAKLAND	Highland	SE¼ SW SW.	28	2 N/S	7 E/W

Distance And Direction from Road Intersections: [illegible]

Street address & City of Well Location: [illegible] Rd

Locate with "X" in section below — Sketch Map:

W — E — S — 1 MI. — 1 MILE

2 FORMATION

FORMATION	THICKNESS OF STRATUM	DEPTH TO BOTTOM OF STRATUM
Dry Gravel	0-80	80
yellow Sand & gravel	20	100
Dirty water Sand.	4	104

USE A 2ND SHEET IF NEEDED

3 OWNER OF WELL:

Address:

4 WELL DEPTH: (completed) 104 ft. Date of Completion April 19, 1972

5

☒ Cable tool ☐ Rotary ☐ Driven ☐ Dug
☐ Hollow rod ☐ Jetted ☐ Bored ☐ ______

6 USE:

☒ Domestic ☐ Public Supply ☐ Industry
☐ Irrigation ☐ Air Conditioning ☐ Commercial
☐ Test Well ☐ ______

7 CASING:

Threaded ☒ Welded ☐

Diam.

4 in. to 104 ft. Depth
4 in. to 104 ft. Depth

Height: Above/Below Surface ______ ft.
Weight ______ lbs./ft.
Drive Shoe? Yes ☒ No ☐

8 SCREEN:

Type: ~~[illegible]~~ SS Dia.: 4
Slot/Gauze 12 Length 4
Set between 100 ft. and 104 ft.
Fittings: STD.

9 STATIC WATER LEVEL

70 ft. below land surface

10 PUMPING LEVEL below land surface

70 ft. after 4 hrs. pumping 20 g.p.m.
70 ft. after 8 hrs. pumping 20 g.p.m.

11 WATER QUALITY in Parts Per Million:

Iron (Fe) ______ Chlorides (Cl) ______
Hardness ______ Other ______

12 WELL HEAD COMPLETION:

☐ In Approved Pit
☒ Pitless Adapter ☒ 12" Above Grade

13 Well Grouted?

☐ Yes ☐ No
☐ Neat Cement ☐ Bentonite ☐ ______
Depth: From ______ ft. to ______ ft.

14 Nearest Source of possible contamination

75 feet S. Direction Septic Type

Well disinfected upon completion ☐ Yes ☐ No

15 PUMP:

☐ Not installed
Manufacturer's Name Flint & Walling
Model Number ______ HP 1 Volts 230
Length of Drop Pipe 80 ft. capacity 15 G.P.M.
Type: ☒ Submersible
☐ Jet ☐ Reciprocating

16 Remarks, elevation, source of data, etc.

JH — JH

...ED BY

ADDITION

elev 1056

17 WATER WELL CONTRACTOR'S CERTIFICATION:

This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

Glenn & Sons. — 0753

REGISTERED BUSINESS NAME — REGISTRATION NO.

Address 3355 Schaffer Rd Pinckney Mi

Signed S.B. Glenn — Date April 19, 1972

AUTHORIZED REPRESENTATIVE

D67d 100M (Rev. 12-68)

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WATER WELL RECORD

ACT 294 PA 1965

MICHIGAN DEPARTMENT OF PUBLIC HEALTH

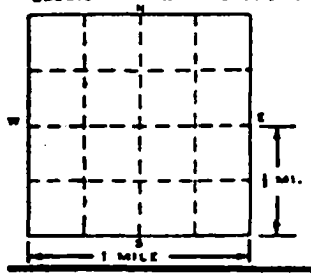
1 LOCATION OF WELL

County	Township Name	Fraction	Section Number	Town Number	Range Number
Oakland	Highland	SE ¼ SW ¼ SW ¼	34	3 N/S.	7 E/W.

Distance And Direction from Road Intersections

Street address & City of Well Location

Locate with "X" in section below. Sketch Map:



3 OWNER OF WELL:

Address

4 WELL DEPTH: (completed) 89 ft. **Date of Completion** 3-81

5 ☒ Cable tool ☐ Rotary ☐ Driven ☐ Dug ☐ Hollow rod ☐ Jetted ☐ Bored ☐ ____

6 USE: ☒ Domestic ☐ Public Supply ☐ Industry ☐ Irrigation ☐ Air Conditioning ☐ Commercial ☐ Test Well ☐

7 CASING: Threaded ☒ Welded ☐ Diam. 4 in. to 85 ft. Depth; ____ in. to ____ ft. Depth. Height: Above/Below Surface 20 ft. Weight 11 lbs./ft. Drive Shoe? Yes ☒ No ☐

8 SCREEN: Johnsson
Type: B/B W/W Dia.: 4"
Slot/Gauze 15 Length 4'
Set between 85 ft. and 89 ft.
Fittings: Standard

9 STATIC WATER LEVEL
49 ft. below land surface

10 PUMPING LEVEL below land surface
75 ft. after 2 hrs. pumping 28 g.p.m.
____ ft. after ____ hrs. pumping ____ g.p.m.

11 WATER QUALITY in Parts Per Million:
Iron (Fe) ____ Chlorides (Cl) ____
Hardness ____ Other ____

12 WELL HEAD COMPLETION: ☐ In Approved Pit ☒ Pitless Adapter ☐ 12" Above Grade

13 Well Grouted? ☐ Yes ☐ No ☐ Neat Cement ☐ Bentonite ☐ ____
Depth: From ____ ft. to ____ ft.

14 Nearest Source of possible contamination
75 feet W Direction septic Type
Well disinfected upon completion ☐ Yes ☐ No

15 PUMP: ☐ Not installed
Manufacturer's Name Tait
Model Number ____ HP 3/4 volts 230
Length of Drop Pipe 68 ft. capacity ____ G.P.M.
Type: ☒ Submersible ☐ Jet ☐ Reciprocating

2 FORMATION	THICKNESS OF STRATUM	DEPTH TO BOTTOM OF STRATUM
Brown Clay & Gravel	4 =	4
Brown Clay & Rocks & Boulders	10	14
Grey Clay	16	30
Brown Sand & Gravel	41	71
Gray Clay	9	80
Med. to Coarse Gray Water Gravel	9	89

USE A 2ND SHEET IF NEEDED

16 Remarks, elevation, source of data, etc.

ADDED INFO. BY DRILLER, ITEM 8B

CORRECTED BY

ADDITION

17 WATER WELL CONTRACTOR'S CERTIFICATION:
This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

Braun Drilling Co. Inc. 26
REGISTERED BUSINESS NAME REGISTRATION NO.

Address Howell

Signed Harry R. Braun Date
AUTHORIZED REPRESENTATIVE

D67d 100M (Rev. 12-68)

GEOLOGICAL SURVEY COPY

11

WATER WELL RECORD
ACT 294 PA 1965

MICHIGAN DEPARTMENT OF PUBLIC HEALTH

LOCATION OF WELL

County: Oakland | Twp.: Highland | Fraction: SW¼NE¼NW¼ | Section No.: 34 | Town: 3 N/S. | Range: 7 E/W.

Distance And Direction from Road Intersections:

OWNER No.

Street address & City of Well Location:

2 FORMATION	THICKNESS OF STRATUM	DEPTH TO BOTTOM OF STRATUM
Sandy Yellow Clay	4'	4'
Dry Yellow Sand	42'	46'
Coarse Water Sand	5'	51'

3 OWNER OF WELL:
Interlakes Mechanical Contracto:
Address: 4165 Martin Road
Walled Lake, Michigan 48088

4 WELL DEPTH: (completed) 52 ft. **Date of Completion** 1-13-69

5 ☒ Cable tool ☐ Rotary ☐ Driven ☐ Dug ☐ Hollow rod ☐ Jetted ☐ Bored ☐ ___

6 USE: ☐ Domestic ☒ Public Supply ☐ Industry ☐ Irrigation ☐ Air Conditioning ☐ Commercial ☐ Test Well ☐ ___

7 CASING: Diam. 4 in. to 52' ft. Depth — Threaded ☒ Welded ☐ — Height: Above surface 6 ft. — Weight 11 lbs/ft. — Drive Shoe? Yes ☒ No ☐
___ in. to ___ ft. Depth

8 SCREEN: Johnson Stainless
Type: Steel Dia.: 4"
Slot/Gauge 40 Length 5'
Set between 46 ft. and 51 ft.
Fittings: 3" x 12" Nipple

9 STATIC WATER LEVEL
17 ft. below land surface

10 PUMPING LEVEL below land surface
30 ft. after 10 hrs. pumping 20 g.p.m.
___ ft. after ___ hrs. pumping ___ g.p.m.

11 WATER QUALITY in Parts Per Million:
Iron (Fe) 0.3 Chlorides (Cl) 34
Hardness 221

12 WELL HEAD COMPLETION: ☐ In Approved Pit ☒ Pitless Adapter ☐ 12" Above Grade

13 GROUTING:
Well Grouted? ☐ Yes ☒ No
Material: ☐ Neat Cement ☐ ___
Depth: From ___ ft. to ___ ft.

14 SANITARY: UNKNOWN
Nearest Source of possible contamination
___ feet ___ Direction ___ Type
Well disinfected upon completion ☒ Yes ☐ No

15 PUMP:
Manufacturer's Name Red Jacket
Model Number R150N4-9CB HP 1 1/2
Length of Drop Pipe 35 ft. capacity 24½ G.P.M.
Type: ☒ Submersible ☐ ___ ☐ Jet ☐ Reciprocating

16 Remarks, elevation, source of data, etc.

ADDED INFO. BY DRILLER. ITEM NO.

CORRECTED BY:

ADDITION BY:

17 WATER WELL CONTRACTOR'S CERTIFICATION:
This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

O. O. Corsaut Inc. — REGISTERED BUSINESS NAME
0025 — REGISTRATION NO.

Address 15101 W. 11 Mile Road, Oak Park 4823?

Signed ___ — AUTHORIZED REPRESENTATIVE
Date April 22, 1969

3670 100M 6-66

GEOLOGICAL SURVEY COPY

WATER WELL RECORD
ACT 294 PA 1965

MICHIGAN DEPARTMENT OF PUBLIC HEALTH

1 LOCATION OF WELL

County	Township Name	Fraction	Section Number	Town Number	Range Number
Oakland	Highland	NW ¼ SE ¼ NW ¼	34	3N N/S.	7E E/W.

Distance And Direction from Road Intersections

Street address & City of

Locate with "X" in section below

Sketch Map:

[redacted]

1 MILE

3 OWNER OF WELL:

Address

4 WELL DEPTH: (completed) Date of Completion

ft.

5 ☐ Cable tool ☐ Rotary ☐ Driven ☐ Dug ☐ Hollow rod ☒ Jetted ☐ Bored ☐ ____

6 USE: ☒ Domestic ☐ Public Supply ☐ Industry ☐ Irrigation ☐ Air Conditioning ☐ Commercial ☐ Test Well ☐

7 CASING: Threaded ☒ Welded ☐ Diam. 2 in. to 63 ft. Depth; 1¼ in. to 68 ft. Depth

Height: Above/Below Surface 1 Above

Weight 2.75 lbs./ft.

Drive Shoe? Yes ☒ No ☐

2 FORMATION	THICKNESS OF STRATUM	DEPTH TO BOTTOM OF STRATUM
Sandy/Drift	36	36
Blue Clay Gravel Mixed	26	62
Water Sand/Gray	6	68
		68

USE A 2ND SHEET IF NEEDED

8 SCREEN:

Type: 836x10 Johnson: 1/14 Slot/Gauze Stainless Steel 5ft.

Set between 63 ft. and 68 ft.

Fittings: 1/14 Coulpings

9 STATIC WATER LEVEL

30 ft. below land surface

10 PUMPING LEVEL below land surface

35 ft. after 1 hrs. pumping 15 PLUS G.P.M.

15 G.P.M. PLUS

____ ft. after ____ hrs. pumping ____ G.P.M.

11 WATER QUALITY in Parts Per Million:

Iron (Fe) ____ Chlorides (Cl) ____

Hardness ____ Other ____

12 WELL HEAD COMPLETION: ☐ In Approved Pit ☒ Pitless Adapter ☒ 12" Above Grade

13 Well Grouted? ☐ Yes ☐ No ☐ Neat Cement ☐ Bentonite ☐ ____

Depth: From ____ ft. to ____ ft.

14 Nearest Source of possible contamination Septic - Rear of House 50' feet ____ Direction ____ Type

Well disinfected upon completion ☒ Yes ☐ No

15 PUMP: ☐ Not installed

Manufacturer's Name ____

Model Number ____ HP ____ Volts ____

Length of Drop Pipe ____ ft. capacity ____ G.P.M.

Type: ☐ Submersible ☒ Jet ☐ Reciprocating

RECEIVED
Dept. of Public Health
MAY 16 1983
Environmental and Occupational Health Services Administration

16 Remarks, elevation, source of data, etc.

ADDED INFO BY DRILLER, ITEM NO.
*CORRECTED BY
**ADDITION BY
ELEVATION
DEPTH TO ROCK

17 WATER WELL CONTRACTOR'S CERTIFICATION:

This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

Syd Ward Well Drilling 1627
REGISTERED BUSINESS NAME REGISTRATION NO.

Address 3900 Seahaban, Drayton Plains, Michigan 48020

Signed ____ Date 5/10/83
AUTHORIZED REPRESENTATIVE

D67d 100M (Rev. 12-68)

GEOLOGICAL SURVEY COPY

WATER WELL RECORD

ACT 294 PA 1965

MICHIGAN DEPARTMENT OF PUBLIC HEALTH

LOCATION OF WELL

County	Twp.	Fraction	Section No.	Town	Range
Oakland	Highland	NE¼NE ¼NW¼	34	3 N/.	7 E/.

Distance And Direction from Road Intersections

OWNER No.

( )

Street address & City of Well Location

3 OWNER OF WELL:

Address [redacted] Rd.

2 FORMATION	THICKNESS OF STRATUM	DEPTH TO BOTTOM OF STRATUM
Sand	9	9
Clay	3	12
Hard sand	12	24
Soft sand	14	38
Sand	9	47

4 WELL DEPTH: (completed) Date of Completion
47 ft. April 17, 1967

5 ☐ Cable tool ☐ Rotary ☐ Driven ☐ Dug ☑ Hollow rod ☐ Jetted ☐ Bored ☐ ___

6 USE: ☑ Domestic ☐ Public Supply ☐ Industry ☐ Irrigation ☐ Air Conditioning ☐ Commercial ☐ Test Well ☐ ___

7 CASING: Diam. Threaded ☑ Welded ☐
2 in. to 44½ ft. Depth
___ in. to ___ ft. Depth
Height: Above/Below surface ___ ft.
Weight 3.75 lbs/ft.
Drive Shoe? Yes ☑ No ☐

8 SCREEN:
Type: wire wound Dia.: 1½" ___
Slot/Gauge 10 Length 2½'
Set between 44½ ft. and 47 ft.
Fittings: standard

9 STATIC WATER LEVEL
30 ft. below land surface

10 PUMPING LEVEL below land surface
___ ft. after 1 hrs. pumping 20 g.p.m.
___ ft. after ___ hrs. pumping ___ g.p.m.

11 WATER QUALITY in Parts Per Million:
Iron (Fe) ___ Chlorides (Cl) ___
Hardness ___

12 WELL HEAD COMPLETION: ☐ In Approved Pit ☑ Pitless Adapter ☐ 12" Above Grade

13 GROUTING:
Well Grouted? ☐ Yes ☒ No
Material: ☐ Neat Cement ☐ ___
Depth: From ___ ft. to ___ ft.

14 SANITARY:
Nearest Source of possible contamination
75 feet ___ Direction septic tank
Well disinfected upon completion ☐ Yes ☐ No

15 PUMP:
Manufacturer's Name Myers
Model Number HC50 HP ½
Length of Drop Pipe 39' ft. capacity 12 G.P.M.
Type: ☐ Submersible ☐ ___ ☒ Jet ☐ Reciprocating

16 Remarks, elevation, source of data, etc.

WELL INFO. BY DRILLER. ITEM NO.

DIRECTED BY:

ADDITION BY

17 WATER WELL CONTRACTOR'S CERTIFICATION:

This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

Brown Drilling Co. — REGISTERED BUSINESS NAME
26 — REGISTRATION NO.

Address Howell, Mich.

Signed [signature] — AUTHORIZED REPRESENTATIVE
Date May 68

D670 100M 6-66

APR 25 1978

WATER WELL RECORD

ACT 294 PA 1965

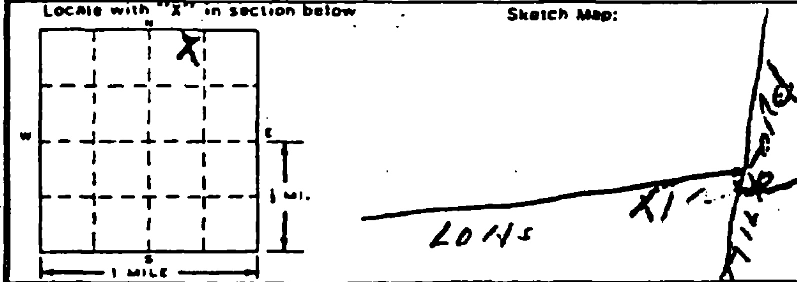
MICHIGAN DEPARTMENT OF PUBLIC HEALTH

1 LOCATION OF WELL

County	Township Name	Fraction	Section Number	Town Number	Range Number
Oakland	[illegible]	NE¼ NW¼ NE¼	34	3 N/S.	7 E/W.

Distance And Direction from Road Intersections

Locate with "X" in section below — Sketch Map:



3 OWNER OF WELL:

Address

4 WELL DEPTH: (Completed) 60 ft. Date of Completion 10.22.77

5 ☒ Cable tool ☐ Rotary ☐ Driven ☐ Dug ☐ Hollow rod ☐ Jetted ☐ Bored ☐ ____

6 USE: ☐ Domestic ☒ Public Supply ☐ Industry ☐ Irrigation ☐ Air Conditioning ☐ Commercial ☐ Test Well ☐ ____

7 CASING: Threaded ☐ Welded ☒ Diam. 4 in. to ___ ft. Depth; ___ in. to ___ ft. Depth. Height: Above/Below Surface ___ ft. Weight ___ lbs./ft. Drive Shoe? Yes ☐ No ☐

2 FORMATION

FORMATION	THICKNESS OF STRATUM	DEPTH TO BOTTOM OF STRATUM
Sand & clay	23	23
Sand & gravel	37	60

USE A 2ND SHEET IF NEEDED

8 SCREEN: Type: [illegible] Dia.: 4 Slot/Gauze 12 Length 5 Set between ___ ft. and ___ ft. Fittings:

9 STATIC WATER LEVEL 20 ft. below land surface

10 PUMPING LEVEL below land surface: ___ ft. after ___ hrs. pumping ___ g.p.m.; ___ ft. after ___ hrs. pumping ___ g.p.m.

11 WATER QUALITY in Parts Per Million: Iron (Fe) ___ Chlorides (Cl) ___ Hardness ___ Other ___

12 WELL HEAD COMPLETION: ☐ In Approved Pit ☒ Pitless Adapter ☒ 12" Above Grade

13 Well Grouted? ☐ Yes ☐ No ☐ Neat Cement ☐ Bentonite ☐ ___ Depth: From ___ ft. to ___ ft.

14 Nearest Source of possible contamination 60 feet N Direction [illegible] Type. Well disinfected upon completion ☒ Yes ☐ No

15 PUMP: ☐ Not installed. Manufacturer's Name ___ Model Number ___ HP ___ Volts ___ Length of Drop Pipe ___ ft. capacity 220 G.P.M. Type: ☐ Submersible ☒ Jet ☐ Reciprocating

16 Remarks, elevation, source of data, etc.

[illegible] INFO BY DRILLER, ITEM NO.
*CORRECTED BY WB
**ADDITION BY
ELEVATION
DEPTH TO ROCK

APR 5 1979 (County Health stamp)

17 WATER WELL CONTRACTOR'S CERTIFICATION: This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

REGISTERED BUSINESS NAME: Ernest Morris REGISTRATION NO. 1154

Address: 840 [illegible]

Signed: [signature] AUTHORIZED REPRESENTATIVE Date

D67d 100M (Rev. 12-68)

GEOLOGICAL SURVEY COPY

JUN - 3 1976

WATER WELL RECORD

ACT 294 PA 1965

MICHIGAN DEPARTMENT OF PUBLIC HEALTH

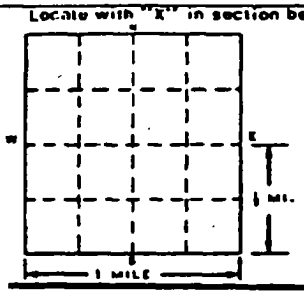
1 LOCATION OF WELL — HIGHLAND

County	Township Name	Fraction	Section Number	Town Number	Range Number
OAK-	WHITE	NW¼ NW¼ NW¼	27	3 N/S.	7 E/W.

Distance And Direction from Road Intersections

Street address & City of Well Location: Pontiac

Locate with "X" in section below — Sketch Map:



3 OWNER OF WELL:

Address

4 WELL DEPTH: (completed) 89 ft. — Date of Completion 7-14-75

5 ☒ Cable tool ☐ Rotary ☐ Driven ☐ Dug ☐ Hollow rod ☐ Jetted ☐ Bored ☐ ____

6 USE: ☒ Domestic ☐ Public Supply ☐ Industry ☐ Irrigation ☐ Air Conditioning ☐ Commercial ☐ Test Well ☐

7 CASING: Threaded ☒ Welded ☐ — Height: Above/Below Surface ____ ft.

4 in. Diam. to 85 ft. Depth — Weight 4 lbs./ft.

____ in. to ____ ft. Depth — Drive Shoe? Yes ☒ No ☐

2 FORMATION	THICKNESS OF STRATUM	DEPTH TO BOTTOM OF STRATUM
Brown Sand	41	41
Gray Sand	6	47
Gray Clay	9	56
Gray Clay & Gravel	3	59
Gravel & Silt	27	86
Gray w/3 Sand	3	89

USE A 2ND SHEET IF NEEDED

8 SCREEN: Type: Johnson Stainless wire — Dia.: 4" — Slot/Gauze 7 — Length 4' — Set between 85 ft. and 89 ft.

Fittings: Standard

9 STATIC WATER LEVEL 40 ft. below land surface

10 PUMPING LEVEL below land surface

____ ft. after ____ hrs. pumping ____ g.p.m.

____ ft. after ____ hrs. pumping ____ g.p.m.

11 WATER QUALITY in Parts Per Million:

Iron (Fe) ____ Chlorides (Cl) ____

Hardness ____ Other ____

12 WELL HEAD COMPLETION: ☐ In Approved Pit ☒ Pitless Adapter ☒ 12" Above Grade

13 Well Grouted? ☐ Yes ☒ No

☐ Neat Cement ☐ Bentonite ☐ ____

Depth: From ____ ft. to ____ ft.

14 Nearest Source of possible contamination

50 feet ____ Direction ____ Septic Type

Well disinfected upon completion ☒ Yes ☐ No

15 PUMP: ☐ Not installed

Manufacturer's Name Red Jacket

Model Number 98E-W1 HP ½ Volts 220

Length of Drop Pipe 70 ft. capacity 15 G.P.M.

Type: ☒ Submersible ☐ Jet ☐ Reciprocating

16 Remarks, elevation, source of data, etc.

ADDED INFO BY DRILLER, ITEM NO.

*CORRECTED BY

**ADDITION BY G

ELEVATION

DEPTH TO ROCK

17 WATER WELL CONTRACTOR'S CERTIFICATION:

This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

Brown Drilling Co. Inc. — 26

REGISTERED BUSINESS NAME — REGISTRATION NO.

Address Howell 2

Signed ____ Date 7-21-75

AUTHORIZED REPRESENTATIVE

367d 100M (Rev. 12-68)

GEOLOGICAL SURVEY COPY

WATER WELL RECORD
ACT 294 PA 1965

MICHIGAN DEPARTMENT OF PUBLIC HEALTH

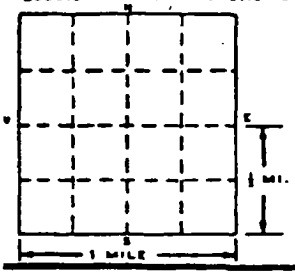
1 LOCATION OF WELL

County	Township Name	Fraction	Section Number	Town Number	Range Number
[illegible]	[illegible]	SW¼SE¼SE¼	36	3 N/S.	7 E/W.

Distance And Direction from Road Intersection: [illegible]

Street address & City of Well Location: [illegible]

Locate with "X" in section below. Sketch Map:



3 OWNER OF WELL: [illegible]

Address [illegible]

4 WELL DEPTH: (completed) 95 ft. **Date of Completion** 3-16-54

5 ☒ Cable tool ☐ Rotary ☐ Driven ☐ Dug ☐ Hollow rod ☐ Jetted ☐ Bored ☐ ____

6 USE: ☒ Domestic ☐ Public Supply ☐ Industry ☐ Irrigation ☐ Air Conditioning ☐ Commercial ☐ Test Well ☐ ____

7 CASING: Threaded ☒ Welded ☐ Diam. 4" ____in. to ____ft. Depth ____in. to ____ft. Depth

Height: Above/Below Surface 1 ft. Weight 11 lbs./ft. Drive Shoe? Yes ☒ No ☐

8 SCREEN: Type: Johnson - Stainless Dia.: 4" Slot/Gauze 10 Length 4 Ft

Set between 91 ft. and 95 ft.

Fittings: K Packer - Plug + Joint Pipe

2 FORMATION	THICKNESS OF STRATUM	DEPTH TO BOTTOM OF STRATUM
Sand / Gravel / clay	54	54
Sand / clay	18	72
Sand / Gravel / Sand water	10	82
Sand / Gravel / W. Plug	13	95

9 STATIC WATER LEVEL 50 ft. below land surface

10 PUMPING LEVEL below land surface

50 ft. after 1 hrs. pumping 25 G.P.M.

50 ft. after ½ hrs. pumping 25 G.P.M.

11 WATER QUALITY in Parts Per Million:

Iron (Fe) ____ Chlorides (Cl) ____

Hardness ____ Other ____

12 WELL HEAD COMPLETION: ☐ In Approved Pit ☒ Pitless Adapter ☒ 12" Above Grade

13 Well Grouted? ☐ Yes ☐ No ☐ Neat Cement ☐ Bentonite ☐ ____

Depth: From ____ ft. to ____ ft.

14 Nearest Source of possible contamination 90 feet W Direction septic Type

Well disinfected upon completion ☒ Yes ☐ No

15 PUMP: ☐ Not Installed

Manufacturer's Name Tuet

Model Number 7CL HP ¾ Volts 220

Length of Drop Pipe 73 ft. capacity 25 G.P.M.

Type: ☒ Submersible ☐ Jet ☐ Reciprocating

RECEIVED
Mich. Dept. of Public Health
OCT 7 1965
Bureau of Environmental and Occupational Health - CWQS

USE A 2ND SHEET IF NEEDED

16 Remarks, elevation, source of data, etc.

17 WATER WELL CONTRACTOR'S CERTIFICATION:

This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

[illegible] Well Drilling C311
REGISTERED BUSINESS NAME REGISTRATION NO.

Address [illegible]

Signed [illegible] Date 9-24-54
AUTHORIZED REPRESENTATIVE

067d 100M (Rev. 12-68)

GEOLOGICAL SURVEY COPY

WATER WELL RECORD

ACT 294 PA 1965

MICHIGAN DEPARTMENT OF PUBLIC HEALTH

LOCATION OF WELL

County	Twp.	Fraction	Section No.	Town	Range
OAK	Highland	SW¼ SW¼ SE¼	36	3 N/S.	7 E/W.

Distance And Direction from Road Intersections

OWNER No.

Street address & City of Well Location

3 OWNER OF WELL:

Address

2 FORMATION	THICKNESS OF STRATUM	DEPTH TO BOTTOM OF STRATUM
Brown Clay	14	14
Brown Gravel	36	50
Gray Gravel	18	68

4 WELL DEPTH: (completed) 68 ft. Date of Completion 1-24-72

5 ☒ Cable tool ☐ Rotary ☐ Driven ☐ Dug ☐ Hollow rod ☐ Jetted ☐ Bored ☐ ___

6 USE: ☒ Domestic ☐ Public Supply ☐ Industry ☐ Irrigation ☐ Air Conditioning ☐ Commercial ☐ Test Well ☐ ___

7 CASING: Diam. Threaded ☒ Welded ☐
4 in. to 64 ft. Depth
___ in. to ___ ft. Depth
Height: Above/Below surface ___ ft.
Weight 11 lbs/ft.
Drive Shoe? Yes ☒ No ☐

8 SCREEN: Johnson S/S
Type: W/W Dia.: 4"
Slot/Gauge 15 Length 4
Set between 64 ft. and 68 ft.
Fittings: Standard

9 STATIC WATER LEVEL
___ ft. below land surface

10 PUMPING LEVEL below land surface
42 ft. after ___ hrs. pumping ___ g.p.m.
___ ft. after ___ hrs. pumping ___ g.p.m.

11 WATER QUALITY in Parts Per Million:
Iron (Fe) 2 PPM Chlorides (Cl) ___
Hardness 19 Grains

12 WELL HEAD COMPLETION: ☐ In Approved Pit ☒ Pitless Adapter ☐ 12" Above Grade

13 GROUTING:
Well Grouted? ☐ Yes ☒ No
Material: ☐ Neat Cement ☐ ___
Depth: From ___ ft. to ___ ft.

14 SANITARY:
Nearest Source of possible contamination
50 feet ___ Direction Septic Type
Well disinfected upon completion ☒ Yes ☐ No

15 PUMP:
Manufacturer's Name Red Jacket
Model Number 9BC HP 2 30
Length of Drop Pipe 51 ft. capacity 15 G.P.M.
Type: ☒ Submersible ☐ ___ ☐ Jet ☐ Reciprocating

16 Remarks, elevation, source of data, etc.

ADDED [illegible] BY [illegible] MILLER, ITEM #8

CORRECTED BY:

ADDITION BY:

17 WATER WELL CONTRACTOR'S CERTIFICATION:
This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

Brown Drilling Co Inc. 26
REGISTERED BUSINESS NAME REGISTRATION NO.

Address 2215 M-59 - Howell

Signed [signature] Date 1-31-72
AUTHORIZED REPRESENTATIVE

D67D 100M 6-66

GEOLOGICAL SURVEY COPY

AUG - 9 1976

WATER WELL RECORD
ACT 294 PA 1965

MICHIGAN DEPARTMENT OF PUBLIC HEALTH

1 LOCATION OF WELL

County	Township Name	Fraction	Section Number	Town Number	Range Number
Oakland	Highland	SE ¼ SE ¼ SW ¼	36	3 N/S.	7 E/W.

Distance And Direction from Road Intersections: [illegible]

3 OWNER OF WELL: [illegible]

Address [illegible]

Street address & City of Well Location

Locate with "X" in section below — W — E — 1 MI. — 1 MILE — S

Sketch Map: [redacted]

4 WELL DEPTH: (completed) 63' ft. Date of Completion 6-12-75

5 [X] Cable tool [ ] Rotary [ ] Driven [ ] Dug [ ] Hollow rod [ ] Jetted [ ] Bored [ ] ____

6 USE: [X] Domestic [ ] Public Supply [ ] Industry [ ] Irrigation [ ] Air Conditioning [ ] Commercial [ ] Test Well [ ] ____

7 CASING: Threaded [X] Welded [ ] Diam. 4 in. to 59 ft. Depth; ___ in. to ___ ft. Depth. Height: Above/Below Surface 1 ft. Weight 11 lbs./ft. Drive Shoe? Yes [X] No [ ]

2 FORMATION	THICKNESS OF STRATUM	DEPTH TO BOTTOM OF STRATUM
Top Soil	4'	4'
yellow Clay gravely	18'	22'
blue Clay & gravel	4'	26'
Cemented gravel	5'	31'
yellow sand - gravel	6'	37'
stones to 2"-3"	1'	38'
sandy clay - blue.	10'	48'
Cemented gravel	3'	51'
fine sand to coarse sand	6'	57'
coarse gravel	6'	63'

USE A 2ND SHEET IF NEEDED

8 SCREEN: Stainless steel. Type: ___ Dia.: 4". Slot/Gauze 18 Length 4'. Set between 59 ft. and 63 ft. Fittings: 3" x 18 nipple "K" packer

9 STATIC WATER LEVEL 38 ft. below land surface

10 PUMPING LEVEL below land surface 38 ft. after 2 hrs. pumping 60 g.p.m.; ___ ft. after ___ hrs. pumping ___ g.p.m.

11 WATER QUALITY in Parts Per Million: Iron (Fe) ___ Chlorides (Cl) ___ Hardness ___ Other ___

12 WELL HEAD COMPLETION: [ ] In Approved Pit [X] Pitless Adapter [X] 12" Above Grade

13 Well Grouted? [ ] Yes [X] No [ ] Neat Cement [ ] Bentonite [ ] ___ Depth: From ___ ft. to ___ ft.

14 Nearest Source of possible contamination 90 feet W Direction Septic Type. Well disinfected upon completion [X] Yes [ ] No

15 PUMP: [ ] Not installed. Manufacturer's Name Flint & Walling. Model Number 5BA8 HP ½ Volts 230. Length of Drop Pipe 50 ft. capacity 12 G.P.M. Type: [X] Submersible [ ] Jet [ ] Reciprocating

16 Remarks, elevation, source of data, etc.

ADDED INFO BY DRILLER, ITEM NO.
CORRECTED BY MB
ADDITION BY
ELEVATION
DEPTH TO ROCK

17 WATER WELL CONTRACTOR'S CERTIFICATION:
This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

Ray Harrison — REGISTERED BUSINESS NAME — 108 REGISTRATION NO.

Address 1225 E. Lake Dr Walled Lake

Signed Ray D. Harrison AUTHORIZED REPRESENTATIVE Date 6-12-75

D47d 100M (Rev. 12-68)

GEOLOGICAL SURVEY COPY

DEC 27 1976

WATER WELL RECORD
ACT 294 PA 1965

MICHIGAN DEPARTMENT OF PUBLIC HEALTH

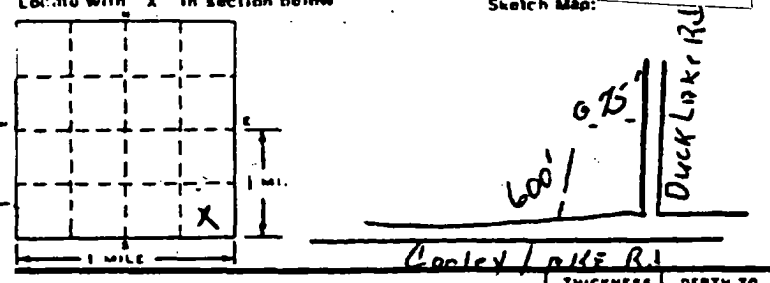
1 LOCATION OF WELL

County	Township Name	Fraction	Section Number	Town Number	Range Number
OAKLAND	HIGHLAND	SE ¼ SW ¼	36	T 3 N/S.	R 7 E/W.

Street Address & City of Well Location

Locate with "X" in section below

Sketch Map:



3 OWNER OF WELL: [illegible]

Address

4 WELL DEPTH: (completed) 80 ft. **Date of Completion**

5 ☒ Cable tool ☐ Rotary ☐ Driven ☐ Dug ☐ Hollow rod ☐ Jetted ☐ Bored ☐ ____

6 USE: ☒ Domestic ☐ Public Supply ☐ Industry ☐ Irrigation ☐ Air Conditioning ☐ Commercial ☐ Test Well ☐

7 CASING: Threaded ☒ Welded ☐ Diam. 4 in. to 76 ft. Depth; ____ in. to ____ ft. Depth. Height: Above/Below Surface 1 ft. Weight 11 lbs./ft. Drive Shoe? yes ☒ no ☐

2 FORMATION

FORMATION	THICKNESS OF STRATUM	DEPTH TO BOTTOM OF STRATUM
0-10 Sand Clay Mix	10	10
10-35 yellow clay	25	35
35-70 gravel	35	70
70-80 Water Sand	10	80

8 SCREEN: Type: Stainless steel Dia.: 4 x 4 Slot/Gauze 10 Length 4 Set between 76 ft. and 80 ft. Fittings: screw fittings packer

9 STATIC WATER LEVEL 60 ft. below land surface

10 PUMPING LEVEL below land surface
60 ft. after 2 hrs. pumping 10 g.p.m.
60 ft. after 1 hrs. pumping 10 g.p.m.

11 WATER QUALITY in Parts Per Million: Iron (Fe) ____ Chlorides (Cl) ____ Hardness ____ Other ____

12 WELL HEAD COMPLETION: ☐ In Approved Pit ☒ Pitless Adapter ☒ 12" Above Grade

13 Well Grouted? ☐ Yes ☐ No ☐ Neat Cement ☐ Bentonite ☐ ____ Depth: From ____ ft. to ____ ft.

14 Nearest Source of possible contamination 75 feet Septic Direction N W Type
Well disinfected upon completion ☐ Yes ☐ By owner

15 PUMP: ☐ Not installed
Manufacturer's Name Gould
Model Number 7EH05411 HP ½ Volts 230
Length of Drop Pipe 68 ft. capacity 4 G.P.M.
Type: ☒ Submersible ☐ Jet ☐ Reciprocating

USE A 2ND SHEET IF NEEDED

NOV 16 1976

15 Remarks, elevation, source of data, etc.

ADDED INFO BY DRILLER, ITEM NO.
*CORRECTED BY: M
**ADDITION BY
ELEVATION
WORK TO ELEV.

17 WATER WELL CONTRACTOR'S CERTIFICATION:
This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

Hewson Well Drilling Co. 0132
REGISTERED BUSINESS NAME REGISTRATION NO.

Address 685 Highland St Milford

Signed Russell Hewson Date 11-10-76
AUTHORIZED REPRESENTATIVE

17d 100M (Rev. 12-68)

GEOLOGICAL SURVEY COPY

13

WATER WELL RECORD
ACT 294 PA 1965

MICHIGAN DEPARTMENT OF PUBLIC HEALTH

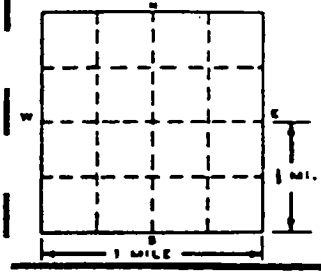
1 LOCATION OF WELL

County	Township Name	Section	Section Number	Town Number	Range Number
OAKLAND	HIGHLAND	SW ¼ SW ¼ SE ¼	36	3 N	7 E

Distance And Direction from Road Intersections

Street address & City of Well Location

Locate with "X" in section below — Sketch Map:



3 OWNER OF WELL:

Address

4 WELL DEPTH: (completed) 71 ft. — Date of Completion 10-13-69

5 ☒ Cable tool ☒ Rotary ☐ Driven ☐ Dug ☐ Hollow rod ☐ Jetted ☐ Bored ☐ ____

6 USE: ☒ Domestic ☐ Public Supply ☐ Industry ☐ Irrigation ☐ Air Conditioning ☐ Commercial ☐ Test Well ☐

7 CASING: Threaded ☒ Welded ☐ Dia. 4" — Height: Above/Below Surface ____ ft.

4" in. to 62 ft. Depth — Weight 11 lbs./ft.

____ in. to ____ ft. Depth — Drive Shoe? Yes ☒ No ☐

2 FORMATION	THICKNESS OF STRATUM	DEPTH TO BOTTOM OF STRATUM
Brown Clay & Gravel	30	30
Gravel	41	71

8 SCREEN:

Type: W/W — Dia.: 4"

Slot/Gauge 30 — Length 4'

Set between 67 ft. and 71 ft.

Fittings: STANDARD

9 STATIC WATER LEVEL

42 ft. below land surface

10 PUMPING LEVEL below land surface

55 ft. after ____ hrs. pumping 40 g.p.m.

____ ft. after ____ hrs. pumping ____ g.p.m.

11 WATER QUALITY in Parts Per Million:

Iron (Fe) ____ Chlorides (Cl) ____

Hardness ____ Other ____

12 WELL HEAD COMPLETION: ☐ In Approved Pit ☒ Pitless Adapter ☒ 12" Above Grade

13 Well Grouted? ☒ Yes ☐ No

☐ Neat Cement ☒ Bentonite ☐ ____

Depth: From ____ ft. to ____ ft.

14 Nearest Source of possible contamination

75 feet ____ Direction ____ Septic Type

Well disinfected upon completion ☒ Yes ☐ No

15 PUMP: ☐ Not installed

Manufacturer's Name Red Jacket

Model Number 11 BB — HP ½ — Volts 230

Length of Drop Pipe 52 ft. capacity ____ G.P.M.

Type: ☒ Submersible ☐ Jet ☐ Reciprocating

USE A 2ND SHEET IF NEEDED

16 Remarks, elevation, source of data, etc.

ADDED [illegible] BY DRILLER. ITEM NO.

ELEVATION BY

EXPLANATION BY

17 WATER WELL CONTRACTOR'S CERTIFICATION:

This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

Brown Drilling Co. Inc. — REGISTERED BUSINESS NAME — 0026 REGISTRATION NO.

Address 2215 M-59 - Howell

Signed Harry R. Brown — AUTHORIZED REPRESENTATIVE — Date Dec 69

D67d 100M (Rev. 12-68)

GEOLOGICAL SURVEY COPY

WATER WELL RECORD
ACT 294 PA 1965

MICHIGAN DEPARTMENT OF PUBLIC HEALTH

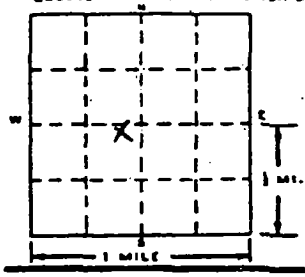
1 LOCATION OF WELL

County	Township Name	Fraction	Section Number	Town Number	Range Number
Oakland	White Lake	NE¼ SW¼ ¼	7	3N N/S.	8E E/W.

Distance And Direction from Road Intersections: [redacted]

Street Address & City of Well Location

Locate with "X" in section below



Sketch Map: [redacted]

3 OWNER OF WELL: White Lake Inn
Address 3955 Ormond Rd. Davisburg, Mi

4 WELL DEPTH: (completed) 80 ft. Date of Completion 1/15/85

5 ☑ Cable tool ☐ Rotary ☑ Driven ☐ Dug ☐ Hollow rod ☐ Jetted ☐ Bored ☐ ____

6 USE: ☐ Domestic ☑ Public Supply ☐ Industry ☐ Irrigation ☐ Air Conditioning ☐ Commercial ☐ Test Well ☐

7 CASING: Threaded ☐ Welded ☑ Diam. 4"
4 in. to 76 ft. Depth
____ in. to ____ ft. Depth
Height: Above/Below Surface 1 ft.
Weight 11 lbs./ft.
Drive Shoe? Yes ☑ No ☐

2 FORMATION	THICKNESS OF STRATUM	DEPTH TO BOTTOM OF STRATUM
Brown sand & gravel	0	27
Blue clay	27	48
Sand, gravel clay	48	65
Sand, gravel & water	65	80

USE A 2ND SHEET IF NEEDED

8 SCREEN: Type Johnson S.S. Dia.: 3"
Slot/Gauze 10 Length 4 FT.
Set between 76 ft. and 80 ft.
Fittings: K-packer, Tail pipe

9 STATIC WATER LEVEL 30 ft. below land surface

10 PUMPING LEVEL below land surface
30 ft. after ½ hrs. pumping 15 G.P.M.
35 ft. after 1 hrs. pumping 20 G.P.M.

11 WATER QUALITY in Parts Per Million:
Iron (Fe) ____ Chlorides (Cl) ____
Hardness ____ Other ____

12 WELL HEAD COMPLETION: ☐ In Approved Pit ☑ Pitless Adapter ☑ 12" Above Grade

13 Well Grouted? ☐ Yes ☐ No ☐ Neat Cement ☐ Bentonite ☐ ____
Depth: From ____ ft. to ____ ft.

14 Nearest Source of possible contamination
____ feet ____ Direction ____ Type
Well disinfected upon completion ☐ Yes ☐ No

15 PUMP: ☐ Not installed
Manufacturer's Name Flint & Walling
Model Number ____ HP 1 Volts ____
Length of Drop Pipe 63 ft. capacity 19 G.P.M.
Type: ☑ Submersible ☐ Jet ☐ Reciprocating

16 Remarks, elevation, source of data, etc.

17 WATER WELL CONTRACTOR'S CERTIFICATION:
This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.
Flint Well Drilling 63-1749
REGISTERED BUSINESS NAME REGISTRATION NO.
Address 4494 Duck Lake, Highland 4803
Signed [signature] AUTHORIZED REPRESENTATIVE Date 1/17/85

D67d 100M (Rev. 12-68)

GEOLOGICAL SURVEY COPY

WATER WELL RECORD
ACT 294 PA 1965

MICHIGAN DEPARTMENT OF PUBLIC HEALTH

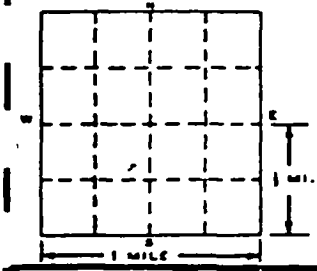
1 LOCATION OF WELL

County	Township Name	Fraction	Section Number	Town Number	Range Number
Oakland	White Lk.	NE ¼ NW ¼ SE ¼	7	3 N/S.	8 E/W.

Distance And Direction from Road Intersections

Street address & City of Well Location

Locate with "X" in section below — Sketch Map:



3 OWNER OF WELL:

Address

4 WELL DEPTH: (completed) 84 ft. — Date of Completion 12-3-85

5 [X] Cable tool [ ] Rotary [ ] Driven [ ] Dug [ ] Hollow rod [ ] Jetted [ ] Bored [ ] ____

6 USE: [X] Domestic [ ] Public Supply [ ] Industry [ ] Irrigation [ ] Air Conditioning [ ] Commercial [ ] Test Well [ ]

7 CASING: Threaded [ ] Welded [X] — Height: Above Surface 1 ft.

Diam. 4 in. to 80 ft. Depth — Weight 10-40 lbs./ft.

____ in. to ____ ft. Depth — Drive Shoe? Yes [X] No [ ]

2 FORMATION	THICKNESS OF STRATUM	DEPTH TO BOTTOM OF STRATUM
Brown Gravel		79
Gray Sand Water	5	84

8 SCREEN:

Type: Johnson — Dia.: 3"

Slot Size 12 — Length 48"

Set between 80 ft. and 84 ft.

Fittings: K-Packer 1' Nipple

9 STATIC WATER LEVEL

63 ft. below land surface

10 PUMPING LEVEL below land surface

70 ft. after 1½ hrs. pumping 70 g.p.m.

____ ft. after ____ hrs. pumping ____ g.p.m.

11 WATER QUALITY in Parts Per Million:

Iron (Fe) ____ Chlorides (Cl) ____

Hardness ____ Other ____

12 WELL HEAD COMPLETION: [ ] In Approved Pit [X] Pitless Adapter [X] 12" Above Grade

13 Well Grouted? [ ] Yes [X] No

[ ] Neat Cement [ ] Bentonite [ ] ____

Depth: From ____ ft. to ____ ft.

14 Nearest Source of possible contamination

75 feet West Direction Septic Type

Well disinfected upon completion? [X] Yes [ ] No

15 PUMP: [ ] Not installed

Manufacturer's Name Red Jacket

Model Number 4x203 — HP ½ — Volts 220

Length of Drop Pipe 53 ft. capacity 10 G.P.M.

Type: [X] Submersible [ ] Jet [ ] Reciprocating

RECEIVED
Mich. Dept. of Public Health
MAR 10 1986
Occupational Health

USE A 2ND SHEET IF NEEDED

16 Remarks, elevation, source of data, etc. Bureau of Environ

17 WATER WELL CONTRACTOR'S CERTIFICATION:

This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

Fetting Well Drilling — 0413

REGISTERED BUSINESS NAME — REGISTRATION NO.

Address 5575 Jackson Blvd. Davisburg, 48015

Signed ____ AUTHORIZED REPRESENTATIVE — Date 3-1-86

D67d 100M (Rev. 12-68)

GEOLOGICAL SURVEY COPY

GEOLOGICAL SURVEY NO

WATER WELL AND PUMP RECORD

PERMIT NUMBER

PART 127 ACT 368, P A 1978

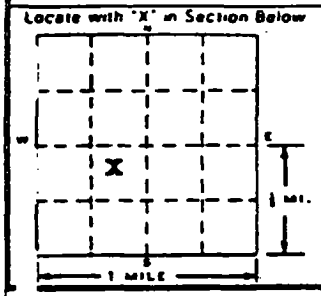
LOCATION OF WELL

County	Township Name	Fraction	Section Number	Town Number	Range Number
Oakland	White Lake	ne ¼ sw ¼ se ¼	7	3 N/S	8 E/W

stance And Direction From Road Intersection

Street Address & City of Well Location

Locate with "X" in Section Below — Sketch Map



3 OWNER OF WELL

Address

Address Same As Well Location? ☒ Yes ☐ No

4 WELL DEPTH (completed) 82 ft. — Date of Completion 1-14-85

5 ☒ Cable tool ☐ Rotary ☐ Driven ☐ Dug ☐ Hollow rod ☐ Auger ☐ Jetted ☐

6 USE ☒ Domestic ☐ Type I Public ☐ Type III Public ☐ Irrigation ☐ Type IIa Public ☐ Heat pump ☐ Test Well ☐ Type IIb Public ☐

7 CASING Diameter ☒ Steel ☐ Threaded ☐ Plastic ☒ Welded
4 in. to 78 ft. depth
in. to ft. depth
Grouted Drill Hole Diameter
in. to ft. depth
in. to ft. depth
Height: Above/Below
Surface 1 ft.
Weight 10.40 lbs./ft.
Drive Shoe ☒ Yes ☐ No

2 FORMATION DESCRIPTION	THICKNESS OF STRATUM	DEPTH TO BOTTOM OF STRATUM
brown gravel--rock		73
med. sand-gravel-water	9	82

8 SCREEN ☐ Not Installed
Type Johnson Diameter 3in.
Slot 12 Length 48in.
Set between 78 ft. and 82 ft.
FITTINGS ☒ K-Packer ☐ Lead Packer ☐ Bremer Check
☒ Blank above screen 1 ft Other

9 STATIC WATER LEVEL
49 ft. below land surface ☐ Flow

10 PUMPING LEVEL below land surface
63 ft. after 1 hrs pumping at 60 G.P.M.
ft. after hrs pumping at G.P.M.

11 WELL HEAD COMPLETION ☒ Pitless adapter ☐ 12" above grade ☐ Basement offset ☐ Approved pit

12 WELL GROUTED? ☒ No ☐ Yes From to ft.
☐ Neat cement ☐ Bentonite ☐ Other
No of bags of cement Additives

13 Nearest source of possible contamination
Type septic Distance 70 ft Direction west
Well disinfected upon completion? ☒ Yes ☐ No

14 PUMP ☐ Not Installed ☐ Pump Installation Only
Manufacturer's name Red Jacket
Model number HP 1/2 Volts 220
Length of Drop Pipe 63 ft capacity 10 G.P.M
TYPE ☒ Submersible ☐ Jet
PRESSURE TANK
Manufacturer's name
Model number WX202 Capacity Gallons

USE A 2ND SHEET IF NEEDED

RECEIVED
Mich. Dept. of Public Health
JUN 7 1985
Bureau of Environmental Health
Water Supply Section

15. Remarks, elevation, source of data, etc.

16. WATER WELL CONTRACTOR'S CERTIFICATION:
This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

Fettig Well Drilling 0413
REGISTERED BUSINESS NAME REGISTRATION NO.
Address 5575 Jacison Blvd. Davisburg
Signed Jerry Fettig Pres Date 5-17-85
AUTHORIZED REPRESENTATIVE

DR7d (Rev 10-80)

MAR 02 1982

WATER WELL RECORD
ACT 294 PA 1965

MICHIGAN DEPARTMENT OF PUBLIC HEALTH

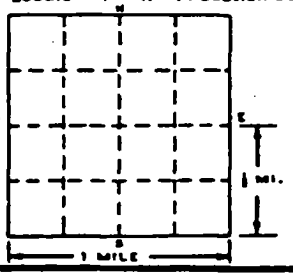
1 LOCATION OF WELL

County	Township Name	Fraction	Section Number	Town Number	Range Number
Oakland	White Lake	NW¼ SW¼ SW¼	7	3 N/S.	8 E/W.

Distance And Direction from Road Intersections

Street address & City of Well Location

Locate with "X" in section below — Sketch Map:



3 OWNER OF WELL:

Address

4 WELL DEPTH: (completed) 29 ft. — Date of Completion 11-22-80

5 ☐ Cable tool ☐ Rotary ☐ Driven ☐ Dug ☒ Hollow rod ☐ Jetted ☐ Bored ☐ ____

6 USE: ☒ Domestic ☐ Public Supply ☐ Industry ☐ Irrigation ☐ Air Conditioning ☐ Commercial ☐ Test Well ☐

7 CASING: Threaded ☒ Welded ☐ — Height: Above/Below Surface 1 ft.

Diam. 2 in. to 25 ft. Depth — Weight 375 lbs./ft.

____ in. to ____ ft. Depth — Drive Shoe? Yes ☐ No ☒

2 FORMATION	THICKNESS OF STRATUM	DEPTH TO BOTTOM OF STRATUM
Set pipe in		
Tap soil drove	25	25
Water - gravel	4	29

USE A 2ND SHEET IF NEEDED

8 SCREEN:

Type: 99 Dia.: 1¼

Slot/Gauge 15 Length 3½

Set between ____ ft. and ____ ft.

Fittings:

9 STATIC WATER LEVEL

12 ft. below land surface

10 PUMPING LEVEL below land surface

20 ft. after 2 hrs. pumping 15 g.p.m.

____ ft. after ____ hrs. pumping ____ g.p.m.

11 WATER QUALITY in Parts Per Million:

Iron (Fe) ____ Chlorides (Cl) ____

Hardness ____ Other ____

12 WELL HEAD COMPLETION: ☐ In Approved Pit ☒ Pitless Adapter ☐ 12" Above Grade

13 Well Grouted? ☒ Yes ☐ No

☐ Neat Cement ☐ Bentonite ☐ ____

Depth: From ____ ft. to ____ ft.

14 Nearest Source of possible contamination

50 feet nth Direction septic Type

Well disinfected upon completion ☒ Yes ☐ No

15 PUMP: ☒ Not installed

Manufacturer's Name ____

Model Number ____ HP ____ Volts ____

Length of Drop Pipe ____ ft. capacity ____ G.P.M.

Type: ☐ Submersible ☐ Jet ☐ Reciprocating

16 Remarks, elevation, source of data, etc.

ADDED INFO BY DRILLER, ITEM NO.
*CORRECTED BY
**ADDITION BY
ELEVATION
DATUM

17 WATER WELL CONTRACTOR'S CERTIFICATION:

This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

Fettig Well Drilling — 0413

REGISTERED BUSINESS NAME — REGISTRATION NO.

Address 5575 Jackson Blvd. Davisburg

Signed Jerry L Fettig — Date 12-4-80

AUTHORIZED REPRESENTATIVE

X67d 100M (Rev. 12-68)

GEOLOGICAL SURVEY COPY

WATER WELL AND PUMP RECORD

PART 127 ACT 368, P.A. 1978

PERMIT NUMBER

MAR 10 2 1982

1 LOCATION OF WELL

County	Township Name	Fraction	Section Number	Town Number	Range Number
Oakland	White Lake	SE 1/4 NW 1/4 SW 1/4	7	3 N/S	8 E/W

Distance And Direction From Road Intersection

Street Address & City of Well Location

Locate with "X" in Section Below — X

Sketch Map

1 MILE

2 FORMATION DESCRIPTION

FORMATION DESCRIPTION	THICKNESS OF STRATUM	DEPTH TO BOTTOM OF STRATUM
Drove		25
Med. Sand - Water	4	29

USE A 2ND SHEET IF NEEDED

3 OWNER OF WELL

Address

Address Same As Well Location? ☐ Yes ☐ No

4 WELL DEPTH (completed) 29 ft. Date of Completion 10-8-81

5 ☐ Cable tool ☐ Rotary ☐ Driven ☐ Dug ☒ Hollow rod ☐ Auger ☐ Jetted ☐

6 USE ☒ Domestic ☐ Type I Public ☐ Type III Public ☐ Irrigation ☐ Type IIa Public ☐ Heat pump ☐ Test Well ☐ Type IIb Public ☐

7 CASING Diameter ☐ Steel ☒ Threaded ☐ Plastic ☐ Welded

2 in. to 25½ depth

in. to ft. depth

Grouted Drill Hole Diameter

in. to ft. depth

in. to ft. depth

Height: Above/Below Surface ft

Weight lbs./ft.

Drive Shoe ☐ Yes ☒ No

8 SCREEN ☐ Not Installed

Type Johnson Diameter 1¼

Slot/Gauze 10 Length 42

Set between 25½ ft. and 29 ft.

FITTINGS: ☐ K-Packer ☐ Lead Packer ☒ Bremer Check

☐ Blank above screen ft. Other 12" nipple 2-coupling

9 STATIC WATER LEVEL 5 ft. below land surface ☐ Flow

10 PUMPING LEVEL below land surface

10 ft. after 2 hrs. pumping at 20 G.P.M.

ft. after hrs. pumping at G.P.M.

11 WELL HEAD COMPLETION ☒ Pitless adapter ☐ 12" above grade ☐ Basement offset ☐ Approved pit

12 WELL GROUTED? ☐ No ☐ Yes From ft. to ft.

☐ Neat cement ☐ Bentonite ☐ Other

No. of bags of cement Additives

13 Nearest source of possible contamination

Type septic Distance 60 ft. Direction N-E

Well disinfected upon completion? ☐ Yes ☐ No

14 PUMP ☐ Not Installed ☐ Pump Installation Only

Manufacturer's name

Model number HP Volts

Length of Drop Pipe ft. capacity G.P.M.

TYPE ☐ Submersible ☐ Jet

PRESSURE TANK

Manufacturer's name

Model number Capacity Gallons

15. Remarks, elevation, source of data, etc.

ADDED INFO BY DRILLER, ITEM NO.

*CORRECTED BY

**ADDITION BY

ELEVATION

DEPTH TO ROCK

16. WATER WELL CONTRACTOR'S CERTIFICATION:

This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief

Fettig's Well Drilling — 0413

REGISTERED BUSINESS NAME — REGISTRATION NO.

Address 5575 Jackson Blvd. Davisburg

Signed Jerry Fettig Pres. — AUTHORIZED REPRESENTATIVE — Date 10-29-81

D67d (Rev 10-80)

2 APR 29 1980

WATER WELL RECORD
ACT 294 PA 1965

MICHIGAN DEPARTMENT OF PUBLIC HEALTH

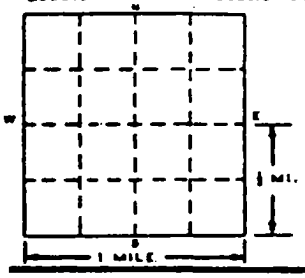
1 LOCATION OF WELL

County	Township Name	Fraction	Section Number	Town Number	Range Number
Oakland	White Lk.	SW ¼ NW ¼ NW ¼	18	3 N/S.	8 E/W.

Distance And Direction from Road Intersections

Street Address & City of Well Location

Locate with "X" in section below — Sketch Map:



3 OWNER OF WELL

Address

4 WELL DEPTH: (completed) 42 ft. **Date of Completion** 9-6-1979

5 ☒ Cable tool ☐ Rotary ☐ Driven ☐ Dug ☐ Hollow rod ☐ Jetted ☐ Bored ☐ ____

6 USE: ☒ Domestic ☐ Public Supply ☐ Industry ☐ Irrigation ☐ Air Conditioning ☐ Commercial ☐ Test Well ☐

7 CASING: Threaded ☒ Welded ☐ Diam. 4"
____ in. to ____ ft. Depth
____ in. to ____ ft. Depth
Height: Above/Below Surface 1 ft.
Weight 11 lbs./ft.
Drive Shoe? Yes ☒ No ☐

2 FORMATION	THICKNESS OF STRATUM	DEPTH TO BOTTOM OF STRATUM
Sand/Gravel	21	21
Sand/Gravel/s clay	16	37
Sand/Gravel/water Bearing	5	42

8 SCREEN:
Type: Johnson Stainless Dia.: 4
Slot/Gauze 10 Length 4 ft
Set between 38 ft. and 42 ft.
Fittings: K. Packer - Tail pipe

9 STATIC WATER LEVEL
18 ft. below land surface

10 PUMPING LEVEL below land surface
18 ft. after 1 hrs. pumping 40 g.p.m.
____ ft. after ____ hrs. pumping ____ g.p.m.

11 WATER QUALITY in Parts Per Million:
Iron (Fe) ____ Chlorides (Cl) ____
Hardness ____ Other ____

12 WELL HEAD COMPLETION: ☐ In Approved Pit ☒ Pitless Adapter ☒ 12" Above Grade

13 Well Grouted? ☐ Yes ☐ No ☐ Neat Cement ☐ Bentonite ☐ ____
Depth: From ____ ft. to ____ ft.

14 Nearest Source of possible contamination
55 feet W Direction Septic Type
Well disinfected upon completion ☒ Yes ☐ No

15 PUMP: ☐ Not installed
Manufacturer's Name Jet
Model Number 10BE-9 HP 1 Volts 230
Length of Drop Pipe 21 ft. capacity 15 G.P.M.
Type: ☒ Submersible ☐ Jet ☐ Reciprocating

RECEIVED APR 21 1980 MICHIGAN DEPT. OF PUBLIC HEALTH

USE A 2ND SHEET IF NEEDED

16 Remarks, elevation, source of data, etc.

ADDED INFO BY DRILLER, ITEM #11
*CORRECTED BY
**ADDITION BY
ELEVATION
DEPTH TO ROCK

17 WATER WELL CONTRACTOR'S CERTIFICATION:
This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

Paul Zelony Well Drilling 0311
REGISTERED BUSINESS NAME — REGISTRATION NO.

Address 4794 N. Duck Lk Rd. Highland

Signed Paul Zelony Date 9-15-79
AUTHORIZED REPRESENTATIVE

X67d 100M (Rev. 12-68)

FEB 8 1977

WATER WELL RECORD
ACT 294 PA 1965

MICHIGAN DEPARTMENT OF PUBLIC HEALTH

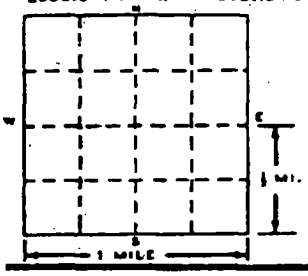
1 LOCATION OF WELL

County	Township Name	Fraction	Section Number	Town Number	Range Number
OAKLAND	WHITE LAKE	NW¼ SW¼ SW	18	3 N/S	8 E/W

Distance And Direction from Road Intersections

Street address & City of Well Location

Locate with "X" in section below — Sketch Map:



3 OWNER OF WELL:

Address

4 WELL DEPTH: (completed) 90 ft. — Date of Completion 5/76

5 ☒ Cable tool ☐ Rotary ☐ Driven ☐ Dug ☐ Hollow rod ☐ Jetted ☐ Bored ☐ ____

6 USE: ☒ Domestic ☐ Public Supply ☐ Industry ☐ Irrigation ☐ Air Conditioning ☐ Commercial ☐ Test Well ☐ ____

7 CASING: Threaded ☐ Welded ☒ — Height: Above/Below Surface ____ ft.

Diam. 4" in. to ____ ft. Depth — Weight ____ lbs./ft.

____ in. to ____ ft. Depth — Drive Shoe? Yes ☒ No ☐

2 FORMATION	THICKNESS OF STRATUM	DEPTH TO BOTTOM OF STRATUM
TOP SOIL		
SAND & GRAVEL		6'
BLUE CLAY	67'	73'
BLUE CLAY & GRAVEL	10'	83'
GRAVEL		90

8 SCREEN:

Type: SLOT. Dia.: 4"

Slot/Gauze 35 Length 4'

Set between 86 ft. and 90 ft.

Fittings: K-PACKER

9 STATIC WATER LEVEL

30 ft. below land surface

10 PUMPING LEVEL below land surface

86 ft. after 1/2 hrs. pumping 30 g.p.m.

____ ft. after ____ hrs. pumping ____ g.p.m.

11 WATER QUALITY in Parts Per Million:

Iron (Fe) ____ Chlorides (Cl) ____

Hardness ____ Other ____

12 WELL HEAD COMPLETION: ☐ In Approved Pit ☒ Pitless Adapter ☐ 12" Above Grade

13 Well Grouted? ☐ Yes ☒ No

☐ Neat Cement ☐ Bentonite ☐ ____

Depth: From ____ ft. to ____ ft.

14 Nearest Source of possible contamination

50 feet W Direction SEPTIC Type

Well disinfected upon completion? ☒ Yes ☐ No

15 PUMP: ☐ Not installed

Manufacturer's Name F&W

Model Number 5BNF HP 1/2 Volts 230

Length of Drop Pipe 83 ft. capacity 10 G.P.M.

Type: ☒ Submersible ☐ Jet ☐ Reciprocating

JAN 28 1977

JAN 28 1977

USE A 2ND SHEET IF NEEDED

16 Remarks, elevation, source of data, etc.

ADDED INFO BY DRILLER, ITEM NO.

*CORRECTED BY

**ADDITION BY B

ELEVATION

DEPTH TO ROCK

17 WATER WELL CONTRACTOR'S CERTIFICATION:

This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

S. WARD'S SONS 0058

REGISTERED BUSINESS NAME — REGISTRATION NO.

Address 6253 CRAMBANE CHARLESTON

Signed S Ward. Date 5/76

AUTHORIZED REPRESENTATIVE

067d 100M (Rev. 12-68)

GEOLOGICAL SURVEY COPY

JUN - 3 1976

WATER WELL RECORD
ACT 294 PA 1965

MICHIGAN DEPARTMENT OF PUBLIC HEALTH

1 LOCATION OF WELL

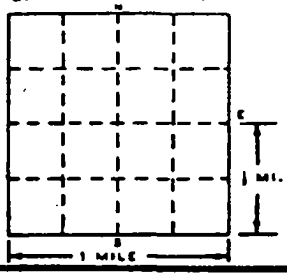
County	Township Name	Fraction	Section Number	Town Number	Range Number
OAKLAND	WHITE LAKE	NW. SW. SW.	18	3 N/S.	8 E/W.

Distance And Direction from Road Intersections

[redacted]

Street address & City of Well Location

Locate with "X" in section below



Sketch Map:

[redacted]

3 OWNER OF WELL:

Address

4 WELL DEPTH: (completed) 110' ft. **Date of Completion** 3/75

5 ☒ Cable tool ☐ Rotary ☐ Driven ☐ Dug ☐ Hollow rod ☐ Jetted ☐ Bored ☐ ____

6 USE: ☒ Domestic ☐ Public Supply ☐ Industry ☐ Irrigation ☐ Air Conditioning ☐ Commercial ☐ Test Well ☐

7 CASING: Threaded ☐ Welded ☒ Diam. 4" in. to ____ ft. Depth; ____ in. to ____ ft. Depth

Height: Above/Below Surface ____ ft. Weight ____ lbs./ft. Drive Shoe? Yes ☒ No ☐

2 FORMATION	THICKNESS OF STRATUM	DEPTH TO BOTTOM OF STRATUM
Gravel.		28'
Gravel & Blue Clay	17'	45'
Blue Clay	38'	83'
Blue Clay & Sand. (Black)	7'	90'
Sand. (FINE)	7'	97'
Sand. (COARSE)		110'

8 SCREEN: Type: Slot. Dia.: 4" Slot/Gauze 10' Length 4' Set between 106 ft. and 110 ft. Fittings: K-PACKER

9 STATIC WATER LEVEL 50 ft. below land surface

10 PUMPING LEVEL below land surface

____ ft. after ____ hrs. pumping ____ G.P.M.

____ ft. after ____ hrs. pumping ____ G.P.M.

11 WATER QUALITY in Parts Per Million:

Iron (Fe) ____ Chlorides (Cl) ____

Hardness ____ Other ____

12 WELL HEAD COMPLETION: ☐ In Approved Pit ☒ Pitless Adapter ☐ 12" Above Grade

13 Well Grouted? ☐ Yes ☒ No ☐ Neat Cement ☐ Bentonite ☐ ____ Depth: From ____ ft. to ____ ft.

14 Nearest Source of possible contamination: 50 feet South direction Septic Type

Well disinfected upon completion ☒ Yes ☐ No

15 PUMP: ☐ Not installed

Manufacturer's Name F-W

Model Number SBA8 HP ½ Volts 230

Length of Drop Pipe 84' ft. capacity 10 G.P.M.

Type: ☒ Submersible ☐ Jet ☐ Reciprocating

USE A 2ND SHEET IF NEEDED

16 Remarks, elevation, source of data, etc.

ADDED INFO BY DRILLER, ITEM NO.
*CORRECTED BY
**ADDITION BY 8
ELEVATION
DEPTH TO ROCK

17 WATER WELL CONTRACTOR'S CERTIFICATION:

This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

S. WALDO & SONS — REGISTERED BUSINESS NAME — 0058 REGISTRATION NO.

Address 6053 CRAMLANE CLARKSTON

Signed [signature] AUTHORIZED REPRESENTATIVE Date 5/75

X67d 100M (Rev. 12-68)

GEOLOGICAL SURVEY COPY

JUN - 3 1976

WATER WELL RECORD
ACT 294 PA 1965

MICHIGAN DEPARTMENT OF PUBLIC HEALTH

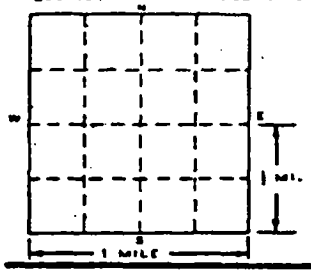
1 LOCATION OF WELL

County	Township Name	Fraction	Section Number	Town Number	Range Number
OAKLAND	WHITE LAKE	NW¼ SW¼ SW¼	16	3 N/S.	8 E/W.

Distance And Direction from Road Intersections

Street address & City of Well Location

Locate with "X" in section below — Sketch Map:



3 OWNER OF WELL: FORREST MILZOW BUILDER
Address CHARLESTON MICH

4 WELL DEPTH: (completed) 45' ft. Date of Completion 3/76

5 ☐ Cable tool ☐ Rotary ☐ Driven ☐ Dug ☐ Hollow Rod ☒ Jetted ☐ Bored ☐ ____

6 USE: ☒ Domestic ☐ Public Supply ☐ Industry ☐ Irrigation ☐ Air Conditioning ☐ Commercial ☐ Test Well ☐

7 CASING: Threaded ☒ Welded ☐ Diam. 2" in. to ____ ft. Depth; ____ in. to ____ ft. Depth
Height: Above/Below Surface ____ ft. Weight ____ lbs./ft. Drive Shoe? Yes ☒ No ☐

8 SCREEN: Type: Slot. Dia.: 1¼" Slot/Gauze 10 Length 4' Set between 41 ft. and 45 ft.
Fittings: BREAKER CHECK

9 STATIC WATER LEVEL 20 ft. below land surface

10 PUMPING LEVEL below land surface 30 ft. after 1 hrs. pumping 12 g.p.m.
____ ft. after ____ hrs. pumping ____ g.p.m.

11 WATER QUALITY in Parts Per Million: Iron (Fe) ____ Chlorides (Cl) ____ Hardness ____ Other ____

12 WELL HEAD COMPLETION: ☐ In Approved Pit ☒ Pitless Adapter ☐ 12" Above Grade

13 Well Grouted? ☐ Yes ☒ No ☐ Neat Cement ☐ Bentonite ☐ ____ Depth: From ____ ft. to ____ ft.

14 Nearest Source of possible contamination 50 feet S Direction SEPTIC Type
Well disinfected upon completion ☒ Yes ☐ No

15 PUMP: ☐ Not installed Manufacturer's Name F & W Model Number C 6345 HP ½ Volts 230 Length of Drop Pipe 34 ft. capacity 10 G.P.M.
Type: ☐ Submersible ☒ Jet ☐ Reciprocating

2 FORMATION	THICKNESS OF STRATUM	DEPTH TO BOTTOM OF STRATUM
GRAVEL		18'
CLAY & GRAVEL	3'	21'
BLUE CLAY & SAND	12'	33'
BLUE CLAY	7'	40'
SAND & GRAVEL		45'

USE A 2ND SHEET IF NEEDED

16 Remarks, elevation, source of data, etc.
ADDED INFO BY DRILLER, ITEM NO.
*CORRECTED BY
**ADDITION BY
ELEVATION
DEPTH TO ROCK

17 WATER WELL CONTRACTOR'S CERTIFICATION:
This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.
SWARTZ & SONS — REGISTERED BUSINESS NAME — 0058 REGISTRATION NO.
Address 6353 CRAMLANE CLARKSTON
Signed J. Ward. AUTHORIZED REPRESENTATIVE Date 3/76

D67d 100M (Rev. 12-68)

GEOLOGICAL SURVEY COPY

AUG 27 1976

WATER WELL RECORD

ACT 294 PA 1965

MICHIGAN DEPARTMENT OF PUBLIC HEALTH

1 LOCATION OF WELL

County	Township Name	Fraction	Section Number	Town Number	Range Number
[illegible]	[illegible]	[illegible]	12	3 N	8 E

[redacted] Distance And Direction from Road Intersections [redacted]

Street ad[redacted]

Locate with "X" in section below — X

Sketch Map: [redacted]

1 MILE

3 OWNER OF WELL

Address

4 WELL DEPTH: (completed) 90 ft. Date of Completion

5
☒ Cable tool ☐ Rotary ☒ Driven ☐ Dug
☐ Hollow rod ☐ Jetted ☐ Bored ☐

6 USE:
☒ Domestic ☐ Public Supply ☐ Industry
☐ Irrigation ☐ Air Conditioning ☐ Commercial
☐ Test Well ☐

7 CASING:
Threaded ☐ Welded ☒
Diam. 4 in. to 90 ft. Depth
in. to ft. Depth
Height: Above/Below Surface 1 ft.
Weight ___ lbs./ft.
Drive Shoe? Yes ☒ No ☐

2 FORMATION

FORMATION	THICKNESS OF STRATUM	DEPTH TO BOTTOM OF STRATUM
Sand + gravel	42'	42'
Clay + gravel	31'	74
Sand + gravel	16	90

USE A 2ND SHEET IF NEEDED

8 SCREEN:
Type [illegible] SS Dia.: 4"
Slot/Gauze 15 Length 3'
Set between 87 ft. and 90 ft.
Fittings: Steel - Nipple - coupling, plug

9 STATIC WATER LEVEL
35 ft. below land surface

10 PUMPING LEVEL below land surface
35 ft. after 2 hrs. pumping 25+ g.p.m.
___ ft. after ___ hrs. pumping ___ g.p.m.

11 WATER QUALITY in Parts Per Million:
Iron (Fe) ___ Chlorides (Cl) ___
Hardness ___ Other ___

12 WELL HEAD COMPLETION:
☐ In Approved Pit
☐ Pitless Adapter ☐ 12" Above Grade

13 Well Grouted? ☐ Yes ☐ No
☐ Neat Cement ☐ Bentonite ☐
Depth: From ___ ft. to ___ ft.

14 Nearest Source of possible contamination
___ feet ___ Direction ___ Type
Well disinfected upon completion ☐ Yes ☐ No

15 PUMP:
☐ Not Installed
Manufacturer's Name
Model Number ___ HP ___ Volts ___
Length of Drop Pipe ___ ft. capacity ___ G.P.M.
Type: ☐ Submersible
☐ Jet ☐ Reciprocating

16 Remarks, elevation, source of data, etc.
ADDED INFO BY DRILLER, ITEM
*CORRECTED BY
**ADDITION BY
ELEVATION
DEPTH TO ROCK

17 WATER WELL CONTRACTOR'S CERTIFICATION:
This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

[illegible] REGISTERED BUSINESS NAME — 115 REGISTRATION NO.

Address 840 [illegible]

Signed [illegible] AUTHORIZED REPRESENTATIVE Date 8.23.76

D67d 100M (Rev. 12-68)

GEOLOGICAL SURVEY COPY

GEOLOGICAL SURVEY SAMPLE NO. _____

MAR 31 1981

WATER WELL RECORD
ACT 294 PA 1965

MICHIGAN DEPARTMENT OF PUBLIC HEALTH

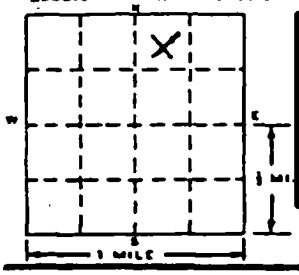
1 LOCATION OF WELL

County	Township Name	Fraction	Section Number	Town Number	Range Number
Oakland	White Lake	¼NW ¼NE¼	19	3 N/S	8 E/W

Distance And Direction from Reference Points

Street address & City of Well Location

Locate with "X" in section below



Sketch Map:

3 OWNER OF WELL:

Address

4 WELL DEPTH: (completed) Date of Completion 11-7-80

110 ft.

5 ☒ Cable tool ☐ Rotary ☐ Driven ☐ Dug ☐ Hollow rod ☐ Jetted ☐ Bored ☐ ____

6 USE: ☒ Domestic ☐ Public Supply ☐ Industry ☐ Irrigation ☐ Air Conditioning ☐ Commercial ☐ Test Well ☐ ____

7 CASING: Threaded ☐ Welded ☒ Height: Above/Below Surface ____ ft.

Diam. 4 in. to 110 ft. Depth Weight 11 lbs./ft.

____ in. to ____ ft. Depth Drive Shoe? Yes ☒ No ☐

2 FORMATION	THICKNESS OF STRATUM	DEPTH TO BOTTOM OF STRATUM
[illegible]	30	[illegible]
[illegible]	30	60
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	10	[illegible]
[illegible]	[illegible]	[illegible]

USE A 2ND SHEET IF NEEDED

8 SCREEN:

Type: [illegible] Dia.: 4"

Slot/Gauge 12 Length 4'

Set between 100 ft. and 110 ft.

Fittings: 1 PACKER + 1 FOOT SCREEN

9 STATIC WATER LEVEL

50 ft. below land surface

10 PUMPING LEVEL below land surface

[illegible] ft. after 1 hrs. pumping 50 g.p.m.

____ ft. after ____ hrs. pumping ____ g.p.m.

11 WATER QUALITY in Parts Per Million:

Iron (Fe) ____ Chlorides (Cl) ____

Hardness ____ Other ____

12 WELL HEAD COMPLETION: ☐ In Approved Pit ☐ Pitless Adapter ☒ 12" Above Grade

13 Well Grouted? ☐ Yes ☒ No ☐ Neat Cement ☐ Bentonite ☐ ____

Depth: From ____ ft. to ____ ft.

14 Nearest Source of possible contamination

____ feet ____ Direction ____ Type

Well disinfected upon completion ☒ Yes ☐ No

15 PUMP: ☐ Not Installed

Manufacturer's Name ____

Model Number ____ HP ____ Volts ____

Length of Drop Pipe ____ ft. capacity ____ G.P.M.

Type: ☐ Submersible ☐ Jet ☐ Reciprocating

MAR 13 1981

16 Remarks, elevation, source of data, etc.

ADDED INFO BY DRILLER, ITEM NO.

*CORRECTED BY

**ADDITION BY

ELEVATION

17 WATER WELL CONTRACTOR'S CERTIFICATION:

This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

REGISTERED BUSINESS NAME ____ REGISTRATION NO. ____

Address ____

Signed ____ Date ____

AUTHORIZED REPRESENTATIVE

D67d 100M (Rev. 12-68)

GEOLOGICAL SURVEY COPY

WATER WELL AND PUMP RECORD

PART 127 ACT 368, P A 1978

PERMIT NUMBER

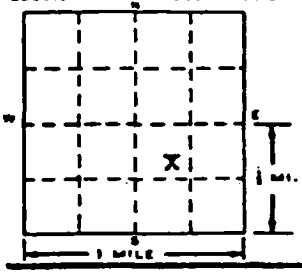
1 LOCATION OF WELL

County	Township Name	Fraction	Section Number	Town Number	Range Number
Oakland	White Lake	NW¼ SE¼ SW¼	19	3 (N/S)	8 (E/W)

Distance And Direction From Road Intersection

Street Address & City of Well Location

Locate with "X" in Section Below — Sketch Map



3 OWNER OF WELL Highland Recreation
Goose Meadow
Address 5200 E. Highland
Michigan

Address Same As Well Location? ☒ Yes ☐ No

4 WELL DEPTH (completed) 81 ft. — **Date of Completion** 12-18-83

5 ☒ Cable tool ☐ Rotary ☐ Driven ☐ Dug ☐ Hollow rod ☐ Auger ☐ Jetted ☐ ____

6 USE ☐ Domestic ☒ Type I Public ☐ Type III Public ☐ Irrigation ☐ Type IIa Public ☐ Heat pump ☐ Test Well ☐ Type IIb Public ☐

7 CASING Diameter ☒ Steel ☐ Threaded ☐ Plastic ☒ Welded
4 in. to 77 ft. depth
____ in. to ____ ft. depth
Grouted Drill Hole Diameter
____ in. to ____ ft. depth
____ in. to ____ ft. depth
Height: Above/Below Surface ____ ft
Weight ____ lbs /ft.
Drive Shoe ☒ Yes ☐ No

2 FORMATION DESCRIPTION	THICKNESS OF STRATUM	DEPTH TO BOTTOM OF STRATUM
Brown Sand - Gravel		28
Blue Clay - Gravel	48	76
Med. Sand - Water	5	81

8 SCREEN ☐ Not Installed
Type Johnson Diameter 3"
Slot/Gauge 12 Length 48
Set between 77 ft. and 81 ft.
FITTINGS ☐ K-Packer ☐ Lead Packer ☒ Bremer Check
☐ Blank above screen ____ ft. Other ____

9 STATIC WATER LEVEL 15 ft. below land surface ☐ Flow

10 PUMPING LEVEL below land surface
32 ft. after 1½ hrs. pumping at 55 G.P.M
____ ft. after ____ hrs. pumping at ____ G.P.M.

11 WELL HEAD COMPLETION ☐ Pitless adapter ☐ 12" above grade ☐ Basement offset ☐ Approved pit

12 WELL GROUTED? ☐ No ☒ Yes From ____ to ____ ft.
☐ Neat cement ☐ Bentonite ☐ Other ____
No. of bags of cement ____ Additives ____

13 Nearest source of possible contamination
Type None Distance ____ ft. Direction ____
Well disinfected upon completion? ☐ Yes ☐ No

14 PUMP ☐ Not Installed ☐ Pump Installation Only
Manufacturer's name Hand Pump
Model number ____ HP ____ Volts ____
Length of Drop Pipe ____ ft. capacity ____ G.P.M
TYPE ☐ Submersible ☐ Jet ____
PRESSURE TANK
Manufacturer's name ____
Model number ____ Capacity ____ Gallons

USE A 2ND SHEET IF NEEDED

15 Remarks, elevation, source of data, etc.
ADDED INFO BY DRILLER
*CORRECTED BY
**ADDITION BY
ELEVATION
DEPTH TO ROCK

16. WATER WELL CONTRACTOR'S CERTIFICATION:
This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief

Fettig's Well Drilling 0413
REGISTERED BUSINESS NAME — REGISTRATION NO.
Address 5575 Jackson Blvd. Dayisburg
Signed Jerry Fettig Pres. Date 1-5-84
AUTHORIZED REPRESENTATIVE

D67d (Rev 10-80)

GEOLOGICAL SURVEY COPY

JAN 08 1979 5

WATER WELL RECORD
ACT 294 PA 1965

MICHIGAN DEPARTMENT OF PUBLIC HEALTH

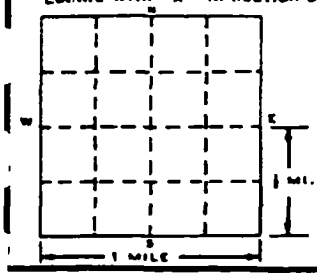
1 LOCATION OF WELL

County	Township Name	Fraction	Section Number	Town Number	Range Number
Oakland	White Lake	Part of set ¼ ¼ ¼	19	3 N/S	8 E/W

Distance And Direction from Road Intersections

Street address & City of Well Location

Locate with "X" in section below — Sketch Map:



3 OWNER OF WELL:

Address

4 WELL DEPTH: (completed) Date of Completion
56 ft.

5 ☒ Cable tool ☐ Rotary ☐ Driven ☐ Dug ☐ Hollow rod ☐ Jetted ☐ Bored ☐ ____

6 USE: ☒ Domestic ☐ Public Supply ☐ Industry ☐ Irrigation ☐ Air Conditioning ☐ Commercial ☐ Test Well ☐

7 CASING: Threaded ☒ Welded ☐ Diam. 4 in. to 56 ft. Depth; ____ in. to ____ ft. Depth
Height: Above/Below Surface ____ ft. Weight ____ lbs./ft. Drive Shoe? Yes ☒ No ☐

2 FORMATION	THICKNESS OF STRATUM	DEPTH TO BOTTOM OF STRATUM
Clay	8	8
Water Sand	12	20
Sandy Clay	5	25
Sand & Gravel	15	40
Fine Sand	9	49
Water Sand	7	56

USE A 2ND SHEET IF NEEDED

8 SCREEN: Johnson
Type: s/s Dia.: 4"
Slot/Gauze 15 Length 5'
Set between 51 ft. and 56 ft.
Fittings: Standard

9 STATIC WATER LEVEL
5 ft. below land surface

10 PUMPING LEVEL below land surface
35 ft. after 3 hrs. pumping 20 g.p.m.
____ ft. after ____ hrs. pumping ____ g.p.m.

11 WATER QUALITY in Parts Per Million:
Iron (Fe) ____ Chlorides (Cl) ____
Hardness ____ Other ____

12 WELL HEAD COMPLETION: ☐ In Approved Pit ☒ Pitless Adapter ☐ 12" Above Grade

13 Well Grouted? ☐ Yes ☐ No ☐ Neat Cement ☐ Bentonite ☐ ____
Depth: From ____ ft. to ____ ft.

14 Nearest Source of possible contamination
75 feet ____ Direction Septic Type
Well disinfected upon completion ☒ Yes ☐ No

15 PUMP: ☐ Not installed
Manufacturer's Name Aermotor
Model Number SD-12-50 HP ½ Volts 230
Length of Drop Pipe 39' ft. capacity ____ G.P.M.
Type: ☒ Submersible ☐ Jet ☐ Reciprocating

RECEIVED DEC 29 1978 MICH. DEPT. OF PUBLIC HEALTH

16 Remarks, elevation, source of data, etc.
ADDED INFO BY DRILLER, ITEM 10
*CORRECTED BY
**ADDITION BY
ELEVATION
DEPTH TO ROCK

17 WATER WELL CONTRACTOR'S CERTIFICATION:
This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

Brown Drilling Co. Inc 26
REGISTERED BUSINESS NAME — REGISTRATION NO.

Address Howell

Signed ____ Date ____
AUTHORIZED REPRESENTATIVE

D67d 100M (Rev. 12-68)

WATER WELL RECORD

ACT 294 PA 1965

MICHIGAN DEPARTMENT OF PUBLIC HEALTH

1 LOCATION OF WELL — SE-NW-NE ☆

County	Twp.	Fraction	Section No.	Town	Range
Oakland	Milford	¼ ¼ ¼	19	3 N.	8 E.

Distance And Direction from Road Intersections

Street address & City of Well Location

3 OWNER OF WELL:

Address

2 FORMATION	THICKNESS OF STRATUM	DEPTH TO BOTTOM OF STRATUM
Clay	18'	18'
Sand Mixed with clay	10'	28'
Gravel mixed with clay	40'	68'
Coarse sand/clay	6'	74'
Sand, Med./water bearing	9'	83'

4 WELL DEPTH: (completed) 83 ft. Date of Completion Apr 24-69

5 ☐ Cable tool ☐ Rotary ☐ Driven ☐ Dug ☒ Hollow rod ☐ Jetted ☐ Bored ☐

6 USE: ☒ Domestic ☐ Public Supply ☐ Industry ☐ Irrigation ☐ Air Conditioning ☐ Commercial ☐ Test Well ☐

7 CASING: Diam. 2 in. to 79 ft. Depth; Threaded ☒ Welded ☐; Height: Above/surface 1 ft.; Weight lbs/ft.; in. to ft. Depth; Drive Shoe? Yes ☐ No ☒

8 SCREEN: Type: Johnson Dia.: 1¼; Slot 10 Length 4'; Set between 79 ft. and 83 ft.; Fittings: 2FT.-1¼ extension Breamer check valve

9 STATIC WATER LEVEL 18 ft. below land surface

10 PUMPING LEVEL below land surface ft. after hrs. pumping g.p.m.; ft. after hrs. pumping g.p.m.

11 WATER QUALITY in Parts Per Million: Iron (Fe) Chlorides (Cl) Hardness

12 WELL HEAD COMPLETION: ☐ In Approved Pit ☒ Pitless Adapter ☐ 12" Above Grade

13 GROUTING: Well Grouted? ☐ Yes ☒ No; Material: ☐ Neat Cement ☐; Depth: From ft. to ft.

14 SANITARY: Nearest Source of possible contamination 50 feet W Direction Septic Type; Well disinfected upon completion ☒ Yes ☐ No

15 PUMP: Manufacturer's Name Rapidayton; Model Number 5CA-H2J-13 HP ½; Length of Drop Pipe 42 ft. capacity 8 G.P.M.; Type: ☐ Submersible ☐; ☒ Jet ☐ Reciprocating

16 Remarks, elevation, source of data, etc.

ADDED INFO BY DRILLER, ITEM 16a

CORRECTED BY: JL

ADDITION ☐

17 WATER WELL CONTRACTOR'S CERTIFICATION:

This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

BoB JaLone, Well Drilling 0633
REGISTERED BUSINESS NAME REGISTRATION NO.

Address 6495 Rowley Drayton Plains, Mi.

Signed Robert J. LaLone Date 4-28-69
AUTHORIZED REPRESENTATIVE

D67D 100M 6-65

MAY 20 1970

GEOLOGICAL SURVEY COPY

MAR 02 1982

WATER WELL RECORD
ACT 294 PA 1965

MICHIGAN DEPARTMENT OF PUBLIC HEALTH

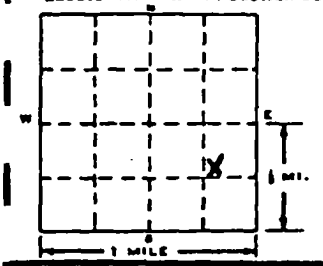
1 LOCATION OF WELL

County	Township Name	Fraction	Section Number	Town Number	Range Number
Oakland	White Lake	NE ¼ SE ¼ NE ¼	30	3 (N/S.)	8 (E/W.)

Distance And Direction from Road Intersections

Street address & City of Well Location

Locate with "X" in section below — Sketch Map:



3 OWNER OF WELL:

Address

4 WELL DEPTH: (completed) 75 ft. **Date of Completion** 12-20-80

5 ☒ Cable tool ☐ Rotary ☐ Driven ☐ Dug ☐ Hollow rod ☐ Jetted ☐ Bored ☐ ____

6 USE: ☒ Domestic ☐ Public Supply ☐ Industry ☐ Irrigation ☐ Air Conditioning ☐ Commercial ☐ Test Well ☐ ____

7 CASING: Threaded ☐ Welded ☒ Diam. 4 in. to 71 ft. Depth; ____ in. to ____ ft. Depth. Height: Above/Below Surface ____ ft. Weight ____ lbs./ft. Drive Shoe? Yes ☐ No ☐

2 FORMATION	THICKNESS OF STRATUM	DEPTH TO BOTTOM OF STRATUM
Drove		70
Med. sand - Coarse gravel		
water	5	75

8 SCREEN: Type: Johnson Dia.: 3" Slot/Gauge 15 Length 48" Set between 71 ft. and 75 ft. Fittings: 1 ft nipple K-pack

9 STATIC WATER LEVEL ____ ft. below land surface

10 PUMPING LEVEL below land surface 48 ft. after 3 hrs. pumping 60 g.p.m. ____ ft. after ____ hrs. pumping ____ g.p.m.

11 WATER QUALITY in Parts Per Million: Iron (Fe) ____ Chlorides (Cl) ____ Hardness ____ Other ____

12 WELL HEAD COMPLETION: ☐ In Approved Pit ☒ Pitless Adapter ☐ 12" Above Grade

13 Well Grouted? ☒ Yes ☐ No ☐ Neat Cement ☐ Bentonite ☐ ____ Depth: From ____ ft. to ____ ft.

14 Nearest Source of possible contamination 55 feet N Direction Septic Type. Well disinfected upon completion ☒ Yes ☐ No

15 PUMP: ☐ Not Installed. Manufacturer's Name F & W. Model Number ____ HP ½ Volts 230. Length of Drop Pipe 50 ft. capacity 10 G.P.M. Type: ☒ Submersible ☐ Jet ☐ Reciprocating

USE A 2ND SHEET IF NEEDED

16 Remarks, elevation, source of data, etc.

ADDED INFO BY DRILLER, FIELD NO.
CORRECTED BY
ADDITION BY
ELEVATION
DEPTH TO ROCK

17 WATER WELL CONTRACTOR'S CERTIFICATION:

This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

Fettig Well Drilling — REGISTERED BUSINESS NAME — 0413 — REGISTRATION NO.

Address 5575 Jackson Blvd. Davisburg

Signed [signature] — AUTHORIZED REPRESENTATIVE — Date 12-31-80

D67d 100M (Rev. 12-68)

GEOLOGICAL SURVEY COPY

MAR 02 1982

WATER WELL RECORD
ACT 294 PA 1965

MICHIGAN DEPARTMENT OF PUBLIC HEALTH

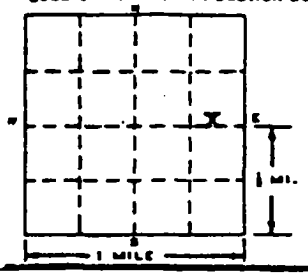
1 LOCATION OF WELL

County	Township Name	Fraction	Section Number	Town Number	Range Number
Oakland	White Lake	SE ¼ NE ¼ SW ¼	30	3 (N/S.)	8 (E/W.)

Distance And Direction from Road Intersections

Street address & City of Well Location

Locate with "X" in section below. Sketch Map:



3 OWNER OF WELL:

Address

4 WELL DEPTH: (completed) Date of Completion: 74 ft. 6-18081

5 ☒ Cable tool ☐ Rotary ☐ Driven ☐ Dug ☐ Hollow rod ☐ Jetted ☐ Bored ☐ ____

6 USE: ☒ Domestic ☐ Public Supply ☐ Industry ☐ Irrigation ☐ Air Conditioning ☐ Commercial ☐ Test Well ☐

7 CASING: Threaded ☐ Welded ☒ Diam. 4 in. to 70 ft. Depth; ____ in. to ____ ft. Depth. Height: Above/Below Surface ____ ft. Weight ____ lbs./ft. Drive Shoe? Yes ☒ No ☐

2

FORMATION	THICKNESS OF STRATUM	DEPTH TO BOTTOM OF STRATUM
Brown Clay - Gravel		14
Blue Clay	15	29
Brown Sand	39	68
Fine to Med. Sand - Water	6	74

USE A 2ND SHEET IF NEEDED

8 SCREEN: Type: Johnson Dia.: 3" Slot/Gauge 10 Length 48" Set between 70 ft. and 74 ft. Fittings: 1" nipple k-pack

9 STATIC WATER LEVEL 25 ft. below land surface

10 PUMPING LEVEL below land surface: 59 ft. after 2 hrs. pumping 30 g.p.m. ____ ft. after ____ hrs. pumping ____ g.p.m.

11 WATER QUALITY in Parts Per Million: Iron (Fe) ____ Chlorides (Cl) ____ Hardness ____ Other ____

12 WELL HEAD COMPLETION: ☐ In Approved Pit ☒ Pitless Adapter ☐ 12" Above Grade

13 Well Grouted? ☒ Yes ☐ No ☐ Neat Cement ☐ Bentonite ☐ ____ Depth: From ____ ft. to ____ ft.

14 Nearest Source of possible contamination: 50 feet W Direction septic Type. Well disinfected upon completion? ☒ Yes ☐ No

15 PUMP: ☐ Not installed. Manufacturer's Name Rapdiation. Model Number ____ HP ½ Volts 230. Length of Drop Pipe 59 ft. capacity 12 G.P.M. Type: ☒ Submersible ☐ Jet ☐ Reciprocating

16 Remarks, elevation, source of data, etc.

ADDED INFO BY DRILLER, ITEM NO.
*CORRECTED BY
**ADDITION BY
ELEVATION
DEPTH TO ROCK

17 WATER WELL CONTRACTOR'S CERTIFICATION:
This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

Fettig's Well Drilling (REGISTERED BUSINESS NAME) 0413 (REGISTRATION NO.)

Address 5575 Jackson Blvd. Davisburg

Signed ____ (AUTHORIZED REPRESENTATIVE) Date 6-25-81

D67d 100M (Rev. 12-68)

GEOLOGICAL SURVEY COPY

GEOLOGICAL SURVEY SAMPLE NO. [illegible]

WATER WELL RECORD
ACT 294 PA 1965

MICHIGAN DEPARTMENT OF PUBLIC HEALTH

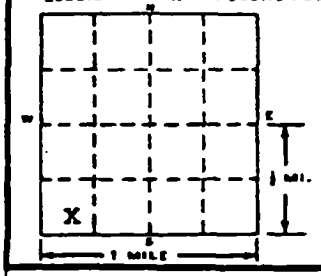
1 LOCATION OF WELL:

County	Township Name	Fraction	Section Number	Town Number	Range Number
Oakland	White Lake	SW ¼ SW ¼ SE ¼	30	3 (N) S.	8 (E) W.

Distance And Direction from Road Intersections

Street address & City of Well Location

Locate with "X" in section below. Sketch Map:



3 OWNER OF WELL:
Address [redacted]

4 WELL DEPTH: (completed) Date of Completion
29 ft.

5 ☐ Cable tool ☐ Rotary ☐ Driven ☐ Dug
☒ Hollow rod ☐ Jetted ☐ Bored ☐ ____

6 USE: ☒ Domestic ☐ Public Supply ☐ Industry
☐ Irrigation ☐ Air Conditioning ☐ Commercial
☐ Test Well ☐ ____

7 CASING: Threaded ☒ Welded ☐ Height: Above/Below Surface ____ ft.
Diam. 2 in. to ____ ft. Depth Weight ____ lbs./ft.
____ in. to ____ ft. Depth Drive Shoe? Yes ☐ No ☐

2 FORMATION	THICKNESS OF STRATUM	DEPTH TO BOTTOM OF STRATUM
Drove		25
Fine gray sand	4	29

8 SCREEN:
Type: Johnson Dia.: 1¼
Slot/Gauge 7 Length 31
Set between 26 ft. and 29 ft.
Fittings: 12" nipple
2-coupling Breamer check

9 STATIC WATER LEVEL
3 ft. below land surface

10 PUMPING LEVEL below land surface
18 ft. after 1 hrs. pumping 15 g.p.m.
____ ft. after ____ hrs. pumping ____ g.p.m.

11 WATER QUALITY in Parts Per Million:
Iron (Fe) ____ Chlorides (Cl) ____
Hardness ____ Other ____

12 WELL HEAD COMPLETION: ☐ In Approved Pit
☒ Pitless Adapter ☐ 12" Above Grade

13 Well Grouted? ☒ Yes ☐ No
☐ Neat Cement ☐ Bentonite ☐ ____
Depth: From ____ ft. to ____ ft.

14 Nearest Source of possible contamination
50 feet N Direction septic Type
Well disinfected upon completion ☒ Yes ☐ No

15 PUMP: ☐ Not installed
Manufacturer's Name Myers
Model Number ____ HP ½ Volts 110
Length of Drop Pipe 18 ft. capacity 8 G.P.M.
Type: ☐ Submersible
☒ Jet ☐ Reciprocating

RECEIVED
[illegible] Dept. of Public Health
APR 19 1983
[illegible]

USE A 2ND SHEET IF NEEDED

16 Remarks, elevation, source of data, etc.
ADDED INFO BY DRILLER, ITEM NO.
*CORRECTED BY
**ADDITION BY
ELEVATION
DEPTH TO ROCK

17 WATER WELL CONTRACTOR'S CERTIFICATION:
This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.
Fettig's Well Drilling 0413
REGISTERED BUSINESS NAME REGISTRATION NO.
Address 5575 Jackson Blv. Davisburg
Signed [signature] Date 2-21-83
AUTHORIZED REPRESENTATIVE

D67d 100M (Rev. 12-68)

GEOLOGICAL SURVEY COPY

FEB 09 1972

WATER WELL RECORD
ACT 294 PA 1965

MICHIGAN DEPARTMENT OF PUBLIC HEALTH

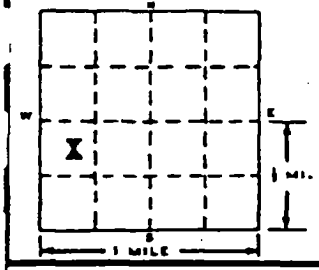
1 LOCATION OF WELL

County	Township Name	Fraction	Section Number	Town Number	Range Number
Oakland	White Lake	NE¼ SE¼ SE¼	30	3 N/S	8 E/W

Distance And Direction from Road Intersections: [illegible] ad)

Street address & City of Well Location:

Locate with "X" in section below — Sketch Map:



3 OWNER OF WELL:
Address: A-Z Contracting
910 Farnsworth
Union Lake, Michigan 48085

4 WELL DEPTH: (completed) 43 ft. Date of Completion 11-23-71

5 [X] Cable tool [ ] Rotary [ ] Driven [ ] Dug [ ] Hollow rod [ ] Jetted [ ] Bored [ ] ____

6 USE: [X] Domestic [ ] Public Supply [ ] Industry [ ] Irrigation [ ] Air Conditioning [ ] Commercial [ ] Test Well [ ]

7 CASING: Threaded [X] Welded [ ] Height: Above/Below Surface 2 ft.
4 in. to 40 ft. Depth — Weight 11 lbs./ft.
____ in. to ____ ft. Depth — Drive Shoe? Yes [X] No [ ]

2 FORMATION	THICKNESS OF STRATUM	DEPTH TO BOTTOM OF STRATUM
Sand W/Stone	5'	5'
Brown Sandy Clay	7'	12'
Sandy Clay	14'	26'
Stony Hardpan	10'	36'
Med Fine Sand	7'	43'

8 SCREEN: Johnson Stainless
Type: Steel Dia.: 4"
Slot/Gage 15 Length 5'
Set between 38 ft. and 43 ft.
Fittings: 3" x 17" Nipple

9 STATIC WATER LEVEL
16 ft. below land surface

10 PUMPING LEVEL below land surface
33 ft. after 4 hrs. pumping 20 g.p.m.
____ ft. after ____ hrs. pumping ____ g.p.m.

11 WATER QUALITY in Parts Per Million:
Iron (Fe) 0.3 Chlorides (Cl) 17
Hardness 272 Other ____

12 WELL HEAD COMPLETION: [ ] In Approved Pit [X] Pitless Adapter [ ] 12" Above Grade

13 Well Grouted? [ ] Yes [X] No
[ ] Neat Cement [ ] Bentonite [ ] ____
Depth: From ____ ft. to ____ ft.

14 Nearest Source of possible contamination: Unknown
____ feet ____ Direction ____ Type
Well disinfected upon completion [X] Yes [ ] No

15 PUMP: [ ] Not installed
Manufacturer's Name: Red Jacket
Model Number R100N1-8CC HP ____ Volts 230
Length of Drop Pipe 28 ft. capacity 22 G.P.M.
Type: [X] Submersible [ ] Jet [ ] Reciprocating

USE A 2ND SHEET IF NEEDED

16 Remarks, elevation, source of data, etc.
ADDED INFO. BY DRILLER, ITEM NO.
CORRECTED BY:
ADDITION BY:

17 WATER WELL CONTRACTOR'S CERTIFICATION:
This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.
O. O. Corsaut, Inc 0025
REGISTERED BUSINESS NAME — REGISTRATION NO.
Address 15101 W. 11 Mile Road, Oak Park 48237
Signed Owen Corsaut Date Jan. 30, 1972
AUTHORIZED REPRESENTATIVE

D67d 100M (Rev. 12-68)

JUN 11 1973

WATER WELL RECORD

ACT 294 PA 1965

MICHIGAN DEPARTMENT OF PUBLIC HEALTH

1 LOCATION OF WELL

County	Township Name	Fraction	Section Number	Town Number	Range Number
Oakland	Highland	¼ ¼ ¼	23	3 N/S	7 E/W

Distance And Direction from Road Intersections

Street Address & City of Well Location

Locate with "X" in section below — Sketch Map:

1 MILE — 1 MI.

3 OWNER OF WELL:

Address

4 WELL DEPTH: (completed) 51 ft. **Date of Completion** April 23-73

5 [X] Cable tool [ ] Rotary [X] Driven [ ] Dug [ ] Hollow rod [ ] Jetted [ ] Bored [ ]

6 USE: [X] Domestic [ ] Public Supply [ ] Industry [ ] Irrigation [ ] Air Conditioning [ ] Commercial [ ] Test Well [ ]

7 CASING: Threaded [X] Welded [ ] Height: Above/Below Surface 1 ft.
Diam. 4 in. to 51 ft. Depth; ___ in. to ___ ft. Depth; Weight 11 lbs./ft.; Drive Shoe? Yes [X] No [ ]

2 FORMATION

FORMATION	THICKNESS OF STRATUM	DEPTH TO BOTTOM OF STRATUM
Yellow Sand	22'	22'
Clay	5'	27'
Yellow Water Sand	24'	51'

USE A 2ND SHEET IF NEEDED

8 SCREEN:
Type: Stainless Dia.: 4"
Slot/Gauze #15 Length 6'
Set between 48 ft. and 51 ft.
Fittings: Packer Plug and coup.

9 STATIC WATER LEVEL
20 ft. below land surface

10 PUMPING LEVEL below land surface
30 ft. after 8 hrs. pumping 25 g.p.m.
___ ft. after ___ hrs. pumping ___ g.p.m.

11 WATER QUALITY in Parts Per Million:
Iron (Fe) ___ Chlorides (Cl) ___
Hardness ___ Other ___

12 WELL HEAD COMPLETION: [ ] In Approved Pit [X] Pitless Adapter [ ] 12" Above Grade

13 Well Grouted? [ ] Yes [X] No
[ ] Neat Cement [ ] Bentonite [ ]
Depth: From ___ ft. to ___ ft.

14 Nearest Source of possible contamination
70 feet E Direction Septic Type
Well disinfected upon completion [X] Yes [ ] No

15 PUMP: [ ] Not installed
Manufacturer's Name Dempster
Model Number OW500 HP ½ Volts 230
Length of Drop Pipe 45 ft. capacity 15 G.P.M.
Type: [X] Submersible [ ] Jet [ ] Reciprocating

16 Remarks, elevation, source of data, etc.

Drillers Log

David Roberts

17 WATER WELL CONTRACTOR'S CERTIFICATION:
This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

John H. Roberts — 0027
REGISTERED BUSINESS NAME — REGISTRATION NO.

Address 2838 Pleasant Valley-Brighton, Mich.

Signed [signature] AUTHORIZED REPRESENTATIVE Date Apr. 23-73

WATER WELL RECORD
ACT 294 PA 1965

MICHIGAN DEPARTMENT OF PUBLIC HEALTH

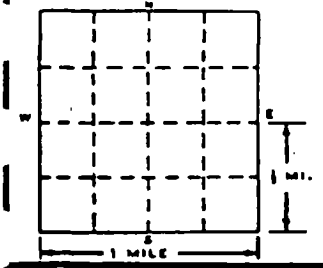
1 LOCATION OF WELL

County	Township Name	Fraction	Section Number	Town Number	Range Number
Oakland	Highland	¼ ¼ ¼	23	T3N N/S.	R7E E/W.

Distance And Direction from Road Intersections

Street address & City of Well Location

Locate with "X" in section below — Sketch Map:



3 OWNER OF WELL:
Address: Bartlett Associates
3133 Union Lake Road
Union Lake, Michigan

4 WELL DEPTH: (completed) 50 ft. **Date of Completion** 4-18-84

5 ☐ Cable tool ☒ Rotary ☐ Driven ☐ Dug ☐ Hollow rod ☐ Jetted ☐ Bored ☐ ____

6 USE: ☒ Domestic ☐ Public Supply ☐ Industry ☐ Irrigation ☐ Air Conditioning ☐ Commercial ☐ Test Well ☐ ____

7 CASING: Threaded ☒ Welded ☐ Height: Above/Below Surface 1 ft.
Diam. 4 in. to 46 ft. Depth — Weight 11.00 lbs./ft.
___ in. to ___ ft. Depth — Drive Shoe? Yes ☒ No ☐

2 FORMATION	THICKNESS OF STRATUM	DEPTH TO BOTTOM OF STRATUM
Sand and gravel brown	20'	20'
Sand brown	15'	35'
Muddy sand and gravel grey	10'	45'
Sand some gravel grey	5'	50'

8 SCREEN:
Type: Slot SS Dia.: 3"
Slot/~~Gap~~ 10 Length 48"
Set between 46 ft. and 50 ft.
Fittings: Neoprene packer

9 STATIC WATER LEVEL
12 ft. below land surface

10 PUMPING LEVEL below land surface
40 ft. after 2 hrs. pumping 20 g.p.m.
___ ft. after ___ hrs. pumping ___ g.p.m.

11 WATER QUALITY in Parts Per Million:
Iron (Fe) ___ Chlorides (Cl) ___
Hardness ___ Other ___

12 WELL HEAD COMPLETION: ☐ In Approved Pit ☒ Pitless Adapter ☒ 12" Above Grade

13 Well Grouted? ☒ Yes ☐ No
☐ Neat Cement ☐ Bentonite ☐ cl y slurry
Depth: From 0 ft. to 25 ft.

14 Nearest Source of possible contamination
75 feet NW Direction Septic Type
Well disinfected upon completion ☒ Yes ☐ No

15 PUMP: ☐ Not installed
Manufacturer's Name Red Jacket
Model Number 9BC HP ½ Volts 220
Length of Drop Pipe 33 ft. capacity 10 G.P.M.
Type: ☒ Submersible ☐ Jet ☐ Reciprocating

RECEIVED
Mich. Dept. of Public Health
JUL 31 1984
Bureau of Environmental and Occupational Health
JUN 25 1984

USE A 2ND SHEET IF NEEDED

16 Remarks, elevation, source of data, etc.
ADDED INFO BY DRILLER, WAM MA
*CORRECTED BY
**ADDITION BY
ELEVATION
DEPTH TO ROCK

17 WATER WELL CONTRACTOR'S CERTIFICATION:
This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.
Reds Water Well Works — 1677
REGISTERED BUSINESS NAME — REGISTRATION NO.
Address 2372 Dexter Road, Auburn Hills, Mich
Signed ____ 7-1-84
AUTHORIZED REPRESENTATIVE

D67d 100M (Rev. 12-68)

GEOLOGICAL SURVEY COPY

2 / AUG - 9 1976

WATER WELL RECORD
ACT 294 PA 1965

MICHIGAN DEPARTMENT OF PUBLIC HEALTH

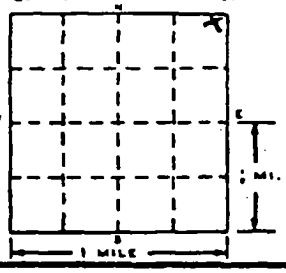
1 LOCATION OF WELL

County	Township Name	Fraction	Section Number	Town Number	Range Number
OAKLAND	HIGHLAND	NE¼ NE¼ NE¼	23	T3N N&S.	R7E E.&W.

Distance And Direction from Road Intersections

Street address & City of Well Location

Locate with "X" in section below — Sketch Map:



3 OWNER OF WELL: JOHNSON HOMES
Address BOX 179 UNION LAKE, Mich.

4 WELL DEPTH: (completed) 45 ft. Date of Completion 3-5-74

5 ☒ Cable tool ☐ Rotary ☐ Driven ☐ Dug ☐ Hollow rod ☐ Jetted ☐ Bored ☐ ____

6 USE: ☒ Domestic ☐ Public Supply ☐ Industry ☐ Irrigation ☐ Air Conditioning ☐ Commercial ☐ Test Well ☐

7 CASING: Threaded ☒ Welded ☐ Diam. 4 in. to 45 ft. Depth; ____ in. to ____ ft. Depth
Height: Above/~~Below~~ Surface 1 ft. Weight 11 lbs./ft. Drive Shoe? Yes ☒ No ☐

2 FORMATION	THICKNESS OF STRATUM	DEPTH TO BOTTOM OF STRATUM
TOP SOIL (SANDY CLAY)	4'	4'
GRAVELY YELLOW CLAY	3'	7'
YELLOW SAND	8'	15'
YELLOW CLAY	3'	18'
BLUE CLAY	4'	22'
FINE GREY SAND	14'	36'
SHARP GREY SAND	4'	40'
COARSE WATER SAND	5'	45'

USE A 2ND SHEET IF NEEDED

8 SCREEN: Type: STAINLESS STEEL Dia.: 4"
Slot/~~Gauze~~ 18 Length 4'
Set between 41 ft. and 45 ft.
Fittings: K-PACKER - 3"x12" NIPPLE

9 STATIC WATER LEVEL 18 ft. below land surface

10 PUMPING LEVEL below land surface
18 ft. after 1 hrs. pumping 60 g.p.m.
____ ft. after ____ hrs. pumping ____ g.p.m.

11 WATER QUALITY in Parts Per Million:
Iron (Fe) ____ Chlorides (Cl) ____
Hardness ____ Other ____

12 WELL HEAD COMPLETION: ☐ In Approved Pit ☒ Pitless Adapter ☐ 12" Above Grade

13 Well Grouted? ☐ Yes ☒ No ☐ Neat Cement ☐ Bentonite ☐ ____
Depth: From ____ ft. to ____ ft.

14 Nearest Source of possible contamination
75 feet SW Direction SEPTIC Type
Well disinfected upon completion ☒ Yes ☐ No

15 PUMP: ☐ Not installed
Manufacturer's Name FLINT & WALLING
Model Number 5BA8 HP ½ Volts 230
Length of Drop Pipe 34 ft. capacity 14 G.P.M.
Type: ☒ Submersible ☐ Jet ☐ Reciprocating

16 Remarks, elevation, source of data, etc.

ADDED INFO BY DRILLER, ITEM NO.
*CORRECTED BY MB
**ADDITION BY
ELEVATION
DEPTH TO ROCK

17 WATER WELL CONTRACTOR'S CERTIFICATION:
This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.
KAY HARRISON 0108
REGISTERED BUSINESS NAME REGISTRATION NO.
Address 225 E. LAKE - WILLED LAKE MI.
Signed Kay D Harrison Date 4-1-74
AUTHORIZED REPRESENTATIVE

D67d 100M (Rev. 12-68)

GEOLOGICAL SURVEY COPY

APR 19 1977

WATER WELL RECORD

ACT 294 PA 1965

MICHIGAN DEPARTMENT OF PUBLIC HEALTH

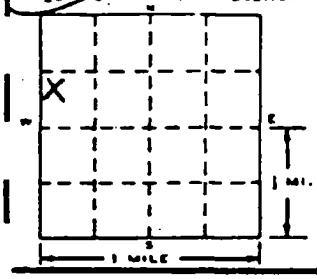
1 LOCATION OF WELL

County	Township Name	Fraction	Section Number	Town Number	Range Number
OAKLAND	HIGHLAND	NW¼ SW¼ NW¼	16	3 (N)S.	7 (E)W.

Distance And Direction from Road Intersections

Street address & City of Well Location

Locate with "X" in section below



Sketch Map: [redacted]

3 OWNER OF WELL:

Address [redacted]

4 WELL DEPTH: (completed) 68 ft. **Date of Completion** 11-12-76

5 ☒ Cable tool ☐ Rotary ☐ Driven ☐ Dug ☐ Hollow rod ☐ Jetted ☐ Bored ☐ ____

6 USE: ☒ Domestic ☐ Public Supply ☐ Industry ☐ Irrigation ☐ Air Conditioning ☐ Commercial ☐ Test Well ☐ ____

7 CASING: Threaded ☒ Welded ☐ Diam. 4 in. to 64 ft. Depth; ____ in. to ____ ft. Depth. Height: Above/Below Surface 1 ft. Weight 11 lbs./ft. Drive Shoe? Yes ☒ No ☐

8 SCREEN: Type: STAIN Dia.: 4" Slot/Gauze 12 Length 6-0 Set between 64 ft. and 68 ft. Fittings: NIP X PAC PLUG

9 STATIC WATER LEVEL 30 ft. below land surface

10 PUMPING LEVEL below land surface 50 ft. after 3 hrs. pumping 25 g.p.m.; ____ ft. after ____ hrs. pumping ____ g.p.m.

11 WATER QUALITY in Parts Per Million: Iron (Fe) ____ Chlorides (Cl) ____ Hardness ____ Other ____

12 WELL HEAD COMPLETION: ☐ In Approved Pit ☒ Pitless Adapter ☐ 12" Above Grade

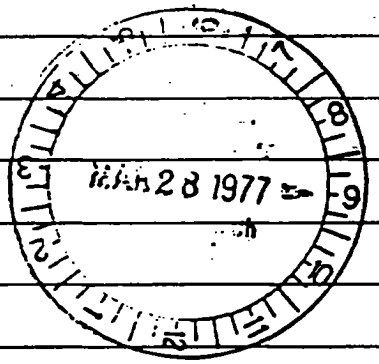
13 Well Grouted? ☐ Yes ☐ No ☐ Neat Cement ☐ Bentonite ☐ ____ Depth: From ____ ft. to ____ ft.

14 Nearest Source of possible contamination 75 feet S Direction SEPTIC Type. Well disinfected upon completion ☒ Yes ☐ No

15 PUMP: ☐ Not installed. Manufacturer's Name T&H. Model Number ____ HP ½ Volts 230. Length of Drop Pipe 50 ft. capacity 10 G.P.M. Type: ☒ Submersible ☐ Jet ☐ Reciprocating

2 FORMATION	THICKNESS OF STRATUM	DEPTH TO BOTTOM OF STRATUM
Y SAND	9	9
Y CLAY & GRAVEL	26	35
G CLAY	18	63
W. SAND	5	68

USE A 2ND SHEET IF NEEDED



16 Remarks, elevation, source of data, etc.

ADDED INFO BY DRILLER, ITEM NO.
*CORRECTED BY WR
**ADDITION BY
ELEVATION
DEPTH TO ROCK

17 WATER WELL CONTRACTOR'S CERTIFICATION:

This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

BRIGHTON DRILL 687
REGISTERED BUSINESS NAME REGISTRATION NO.

Address 2800 PLEASANT VLY

Signed David Rickett Date 11-17-76
AUTHORIZED REPRESENTATIVE

D67d 100M (Rev. 12-68)

35

WATER WELL RECORD

ACT 294 PA 1965

MICHIGAN DEPARTMENT OF PUBLIC HEALTH

(?) 23-1

1 LOCATION OF WELL

County	Twp.	Fraction	Section No.	Town	Range
Oakland	Highland	NW¼SW¼SW¼	23	3 N/S	7 E/W

Distance And Direction from Road Intersections

OWNER No.

Street address & City of Well Location

3 OWNER OF WELL:

2 FORMATION	THICKNESS OF STRATUM	DEPTH TO BOTTOM OF STRATUM
Sand-clay	16	16
Sand	14	30
Soft sand	25	55
Sand-gravel	5	60

elev. 1010 ±10 ft

st. w. el. 977 ±10

4 WELL DEPTH: (completed) 60 ft. Date of Completion April 2, 1968

5 ☒ Cable tool ☐ Rotary ☐ Driven ☐ Dug ☐ Hollow rod ☐ Jetted ☐ Bored ☐ ___

6 USE: ☒ Domestic ☐ Public Supply ☐ Industry ☐ Irrigation ☐ Air Conditioning ☐ Commercial ☐ Test Well ☐ ___

7 CASING: Diam. 4 in. to 56 ft. Depth; Threaded ☒ Welded ☐; Height: Above/Below surface ___ ft.; Weight 11 lbs/ft.; ___ in. to ___ ft. Depth; Drive Shoe? Yes ☒ No ☐

8 SCREEN:

Type wire wound Dia.: 3 3/4" OD

Slot/Gauze 20slot Length 4'

Set between 56 ft. and 60 ft.

Fittings: standard

9 STATIC WATER LEVEL

33 ft. below land surface

10 PUMPING LEVEL below land surface

42 ft. after 2 hrs. pumping 20 g.p.m.

___ ft. after ___ hrs. pumping ___ g.p.m.

11 WATER QUALITY in Parts Per Million:

Iron (Fe) ___ Chlorides (Cl) ___

Hardness ___

12 WELL HEAD COMPLETION: ☐ In Approved Pit ☒ Pitless Adapter ☐ 12" Above Grade

13 GROUTING:

Well Grouted? ☐ Yes ☒ No

Material: ☐ Neat Cement ☐ ___

Depth: From ___ ft. to ___ ft.

14 SANITARY:

Nearest Source of possible contamination

75 feet ___ Direction septic tank

Well disinfected upon completion ☒ Yes ☐ No

15 PUMP:

Manufacturer's Name Red Jacket

Model Number 7BB HP ½

Length of Drop Pipe 42 ft. capacity 12 G.P.M.

Type: ☒ Submersible ☐ ___ ☐ Jet ☐ Reciprocating

16 Remarks, elevation, source of data, etc.

ADDED INFO. BY DRILLER, ITEM NO.

CORRECTED BY:

DESCRIPTION BY:

17 WATER WELL CONTRACTOR'S CERTIFICATION:

This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

Brown Drilling Co. (REGISTERED BUSINESS NAME) 26 (REGISTRATION NO.)

Address Howell, Michigan

Signed [signature] (AUTHORIZED REPRESENTATIVE) Date Oct 68

D67C 100M 6-66

GEOLOGICAL SURVEY NO [ ]

W ER WELL AND PUMP RECC)

PERMIT NUMBER [ ][ ][ ][ ][ ][ ][ ][ ]

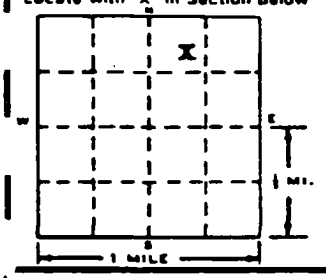
1 LOCATION OF WELL

County	Township Name	Fraction	Section Number	Town Number	Range Number
Oakland	Highland	NW ¼ NE ¼ SE ¼	26	30 (N/S)	7 (E/W)

Distance And Direction From Road Intersection

Street Address & City of Well Location

Locate with "X" in Section Below



Sketch Map:

3 OWNER OF WELL

Address

Address Same As Well Location? [X] Yes [ ] No

4 WELL DEPTH: (completed) 51 ft. | **Date of Completion** 10-27-85

5 [X] Cable tool [ ] Rotary [ ] Driven [ ] Dug [ ] Hollow rod [ ] Auger [ ] Jetted [ ]

6 USE: [X] Domestic [ ] Type I Public [ ] Type III Public [ ] Irrigation [ ] Type IIa Public [ ] Heat pump [ ] Test Well [ ] Type IIb Public [ ]

7 CASING: Diameter [X] Steel [ ] Threaded [ ] Plastic [X] Welded

4 in. to 47 ft. depth

____ in. to ____ ft. depth

Grouted Drill Hole Diameter

____ in. to ____ ft. depth

____ in. to ____ ft. depth

Height: Above/Below Surface ____ ft.

Weight 10-40 lbs./ft.

Drive Shoe [X] Yes [ ] No

2 FORMATION DESCRIPTION	THICKNESS OF STRATUM	DEPTH TO BOTTOM OF STRATUM
Brown sand - brown clay		41
Med. sand, gravel-water	10	51

8 SCREEN: [ ] Not installed

Type Johnson Diameter 3"

Slot/Gauge 12 Length 48

Set between 47 ft. and 51 ft.

FITTINGS: [X] K-Packer [ ] Lead Packer [ ] Bronner Check

[X] Blank above screen 1 ft. Other 1" nipple

9 STATIC WATER LEVEL: 16 ft. below land surface [ ] Flow

10 PUMPING LEVEL: below land surface

35 ft. after 3 hrs. pumping at 50 G.P.M.

____ ft. after ____ hrs. pumping at ____ G.P.M.

11 WELL HEAD COMPLETION: [X] Pitless adapter [X] 12" above grade [ ] Basement offset [ ] Approved pit

12 WELL GROUTED? [X] No [ ] Yes From ____ to ____ ft.

[ ] Neat cement [ ] Bentonite [ ] Other ____

No. of bags of cement ____ Additives ____

13 Nearest source of possible contamination

Type septic Distance 54 ft. Direction north

Well disinfected upon completion? [X] Yes [ ] No

14 PUMP: [ ] Not installed [ ] Pump Installation Only

Manufacturer's name Red Jacket

Model number ____ HP ½ Volts 220

Length of Drop Pipe 35 ft. capacity 10 G.P.M.

TYPE: [X] Submersible [ ] Jet ____

PRESSURE TANK

Manufacturer's name ____

Model number WX203 Capacity ____ Gallons

USE A 2ND SHEET IF NEEDED

RECEIVED

1986

15. Remarks, elevation, source of data, etc.

16. WATER WELL CONTRACTOR'S CERTIFICATION:

This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

Fettig's Well Drilling 0413

REGISTERED BUSINESS NAME REGISTRATION NO

Address 5575 Jackson Blvd. Davisburg

Signed Jerry L Fettig Pres. Date 1-16-86

AUTHORIZED REPRESENTATIVE

Authority: Act 368 PA 1978

Completion: Required

Penalty: Conviction of a violat... of any provision is ...

3676 2/84

GEOLOGICAL SURVEY COPY

AUG 0 6 1984

WATER WELL AND PUMP RECORD

PERMIT NUMBER

1 LOCATION OF WELL

County	Township Name	Fraction	Section Number	Town Number	Range Number
Oakland	Highland	SE ¼ SE ¼ SW ¼	13	3 N/S	7 E/W

Distance & Direction from Road Intersection: IU

Street Address & City of Well Location:

Locate with "X" in Section Below — Sketch Map

[redacted]

1 MILE

3 OWNER OF WELL: Burger King

Address:

Address Same As Well Location? ☐ Yes ☐ No

4 WELL DEPTH (completed): 67 ft — Date of Completion: 5-5-84

5 ☑ Cable tool ☐ Rotary ☐ Driven ☐ Dug ☐ Hollow rod ☐ Auger ☐ Jetted ☐

6 USE ☐ Domestic ☐ Type I Public ☐ Type III Public ☐ Irrigation ☐ Type IIa Public ☐ Heat pump ☐ Test Well ☑ Type IIb Public ☐

7 CASING Diameter 4 in. to 67 ft. depth ☑ Steel ☐ Plastic ☐ Threaded ☑ Welded — Height Above/[redacted] Surface 1 ft — Weight 11 lbs/ft

Drive Shoe ☑ Yes ☐ No

Grouted Hole Diameter: ___ in. to ___ ft. depth; ___ in. to ___ ft. depth

2 FORMATION DESCRIPTION

FORMATION DESCRIPTION	THICKNESS OF STRATUM	DEPTH TO BOTTOM OF STRATUM
Brown Sand	5	5
Brown Fine Gravel	15	20
Grey Med Gravel	10	30
Blue Clay	17	47
Med Sand (Grey)	10	57
Fine Gravel	10	67

USE A 2ND SHEET IF NEEDED

8 SCREEN ☐ Not installed — Type Stainless — Diameter 3 — Slot [redacted] 15 — Length 4' — Set between 63 ft. and 67 ft.

Fittings: ☑ K Packer ☐ Lead Packer ☐ Bremer Check ☑ Blank above screen 1 ft — Other

9 STATIC WATER LEVEL 33 ft. below land surface ☐ Flow

10 PUMPING LEVEL below land surface: 50 ft. after 2 hrs. pumping at 30+ G.P.M.; ___ ft. after ___ hrs. pumping at ___ G.P.M.

11 WELL HEAD COMPLETION ☑ Pitless adapter ☑ 12" above grade ☐ Basement offset ☐ Approved pit

12 WELL GROUTED? ☑ No ☐ Yes From ___ to ___ ft. ☐ Neat cement ☐ Bentonite ☐ Other — No. of bags of cement ___ Additives ___

13 Nearest source of possible contamination: Type Storm Drain — Distance 75 ft. — Direction E — Well disinfected upon completion? ☑ Yes ☐ No

14 PUMP ☐ Not installed ☐ Pump installation Only — Manufacturer's name Red Jacket — Model number 100W1 8CC — HP 1 — Volts 220 — Length of Drop Pipe 50 ft. — capacity 18 G.P.M. — Type: ☑ Submersible ☐ Jet

PRESSURE TANK — Manufacturer's name Well-X-Trol — Model number 203 — Capacity 80 Gallons

15 Remarks, elevation, source of data, etc.

RECEIVED
Mich. Dept. of Public Health
JUN 2 6 1984
Bureau of Environmental and Occupational Health - GWQS

DC INFO BY DRILLER
CORRECTED BY
ADDITION BY
LOCATION
DEPTH TO ROCK

16 WATER WELL CONTRACTOR'S CERTIFICATION

This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

Ernest C Moore Well Drilling Inc — 63-115
REGISTERED BUSINESS NAME — REGISTRATION NO.

Address: 840 N. Hickory Ridge Highland Mich

Signed: Michael [signature] — Date 5-14-84
AUTHORIZED REPRESENTATIVE

AUG 0 6 1984

WATER WELL AND PUMP RECORD

PART 127 ACT 368 P.A. 1978

PERMIT NUMBER

1 LOCATION OF WELL

County	Township Name	Fraction	Section Number	Town Number	Range Number
Oakland	Highland	SE¼ SE¼ SW¼	13	2 N	7 E

Distance And Direction From Road Intersection

[redacted]

Street Address & City of Well Location

Locate with "X" in Section Below — Sketch Map

[redacted]

3 OWNER OF WELL: Burger King

Address

Address Same As Well Location? ☐ Yes ☐ No

4 WELL DEPTH (completed): 62 ft — Date of Completion: 5-3-84

5 ☑ Cable tool ☐ Rotary ☐ Driven ☐ Dug ☐ Hollow rod ☐ Auger ☐ Jetted ☐

6 USE ☐ Domestic ☐ Type I Public ☐ Type III Public ☐ Irrigation ☐ Type IIa Public ☐ Heat pump ☐ Test Well ☑ Type IIb Public ☐

7 CASING ☑ Steel ☐ Threaded ☐ Plastic ☑ Welded

Diameter: 4 in. to 62 ft. depth; ___ in. to ___ ft. depth

Height Above Surface: 1 ft. Weight: 11 lbs/ft.

Grouted Drill Hole Diameter: ___ in. to ___ ft. depth; ___ in. to ___ ft. depth

Drive Shoe ☑ Yes ☐ No

2 FORMATION DESCRIPTION

FORMATION DESCRIPTION	THICKNESS OF STRATUM	DEPTH TO BOTTOM OF STRATUM
Brown Sand	5	5
Brown Fine Gravel	15'	20
Grey Med Gravel	10	30
Blue Clay	17	47
Med Sand (Grey)	10'	57
Fine Gravel	5	62

USE A 2ND SHEET IF NEEDED

8 SCREEN ☐ Not installed

Type: Stainless — Diameter: 3" — Slot: 15 — Length: 4

Set between 58 ft. and 62 ft.

FITTINGS ☑ K-Packer ☐ Lead Packer ☐ Bremer Check

☑ Blank above screen 1 ft. Other: ___

9 STATIC WATER LEVEL: 33 ft. below land surface ☐ Flow

10 PUMPING LEVEL below land surface: 50 ft. after 2 hrs. pumping at 30+ G.P.M.; ___ ft. after ___ hrs. pumping at ___ G.P.M.

11 WELL HEAD COMPLETION ☑ Pitless adapter ☑ 12" above grade ☐ Basement offset ☐ Approved pit

12 WELL GROUTED? ☑ No ☐ Yes From ___ to ___ ft.

☐ Neat cement ☐ Bentonite ☐ Other ___

No. of bags of cement ___ Additives ___

13 Nearest source of possible contamination

Type: Storm Drain — Distance: 75 ft. — Direction: E

Well disinfected upon completion? ☑ Yes ☐ No

14 PUMP ☐ Not installed ☐ Pump installation only

Manufacturer's name: Red Jacket

Model number: 100UE8CL HP: 1 Volts: 220

Length of Drop Pipe: 50 ft. capacity: 18 G.P.M.

TYPE ☑ Submersible ☐ Jet

PRESSURE TANK — Manufacturer's name: Well-X-Trol

Model number: 203 Capacity: 80 Gallons

RECEIVED
Mich. Dept. of Public Health
JUN 2 6 1984
Bureau of Environmental and Occupational Health - GWQS

15 Remarks, elevation, source of data, etc.

*ULD INFO BY DRILLER, ITEM NA

*CORRECTED BY

**ADDITION BY

ELEVATION

DEPTH TO ROCK

16 WATER WELL CONTRACTOR'S CERTIFICATION

This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

Ernest C. Thomas Well Drilling Inc — 63-1154

REGISTERED BUSINESS NAME — REGISTRATION NO.

Address: 840 N. Hickory Ridge [illegible] Highland Mi 48031

Signed: Michael [illegible] — AUTHORIZED REPRESENTATIVE — Date: 5-14-84

D67c Rev. 10/83

OCT 14 1983 WATER WELL AND PUMP RECORD

PART ... ACT 368 P.A. 1978

PERMIT NUMBER

1 LOCATION OF WELL

County	Township Name	Fraction	Section Number	Town Number	Range Number
Oakland	Highland	NE ¼ NE SW ¼	13	3 N/S	7 E/W

Distance And Direction from Road Intersection

[redacted]

3 OWNER OF WELL

[redacted]

Locate with "X" in Section Below

X

1 MILE

[redacted]

4 WELL DEPTH (completed): 58 ft 6 | Date of Completion:

5 ☒ Cable tool ☐ Rotary ☐ Driven ☐ Dug ☐ Hollow rod ☐ Auger ☐ Jetted ☐

6 USE ☒ Domestic ☐ Type I Public ☐ Type III Public ☐ Irrigation ☐ Type IIa Public ☐ Heat pump ☐ Test Well ☐ Type IIb Public ☐

7 CASING ☒ Steel ☐ Threaded ☐ Plastic ☐ Welded; Diameter ___ in. to 53 6 ft. depth; ___ in. to ___ ft. depth. Height: Above/Below (Above circled) Surface 1 ft. Weight ___ lbs/ft. Grouted Drill Hole Diameter ___ in. to ___ ft. depth; ___ in. to ___ ft. depth. Drive Shoe ☒ Yes ☐ No

2 FORMATION DESCRIPTION	THICKNESS OF STRATUM	DEPTH TO BOTTOM OF STRATUM
clay + Sand ledges	25	25
water Sand (low Static)	20	45
clay + gravel	4	49
... coarse gravel + Sand	9 6	58 6

USE A 2ND SHEET IF NEEDED

8 SCREEN ☐ Not installed. Type: Johnson SS; Diameter 4"; Slot Gauze ___; Length 5'; Set between 53 6 ft. and 58 6 ft. FITTINGS ☒ K-Packer ☐ Lead Packer ☐ Bremer Check ☒ Blank above screen 1 ft. Other ___

9 STATIC WATER LEVEL ___ ft. below land surface ☐ Flow

10 PUMPING LEVEL below land surface ___ ft. after 1 hrs. pumping at 20+ G.P.M.; ___ ft. after ___ hrs. pumping at ___ G.P.M.

11 WELL HEAD COMPLETION ☒ Pitless adapter ☒ 12" above grade ☐ Basement offset ☐ Approved pit

12 WELL GROUTED? ☐ No ☐ Yes From ___ to ___ ft. ☐ Neat cement ☐ Bentonite ☐ Other ___ No. of bags of cement ___ Additives ___

13 Nearest source of possible contamination: Type ___ Distance ___ ft. Direction ___ Well disinfected upon completion? ☐ Yes ☐ No

14 PUMP ☐ Not installed ☐ Pump installation Only. Manufacturer's name ___ Model number ___ HP ___ Volts ___ Length of Drop Pipe ___ ft. capacity ___ G.P.M. TYPE ☐ Submersible ☐ Jet ___ PRESSURE TANK Manufacturer's name ___ Model number ___ Capacity ___ Gallons

15 Remarks, elevation, source of data, etc.

SEP 15 1983

ADDED INFO BY DRILLER, ITEM NO. ___ CORRECTED BY ___ ADDITION BY ___ ELEVATION ___ DEPTH TO ROCK

16 WATER WELL CONTRACTOR'S CERTIFICATION

This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

Ernest Morris W.D. — 1154
REGISTERED BUSINESS NAME — REGISTRATION NO.

Address 840 N. ...

Signed [signature] AUTHORIZED REPRESENTATIVE — Date 9-3-83

GEOLOGICAL SURVEY COPY

APR 29 1980

WATER WELL RECORD
ACT 294 PA 1965

MICHIGAN DEPARTMENT OF PUBLIC HEALTH

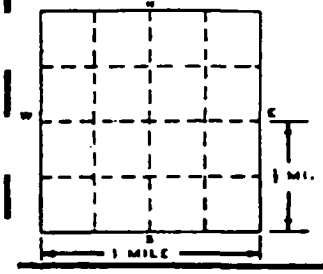
1 LOCATION OF WELL

County	Township Name	Fraction	Section Number	Town Number	Range Number
Oakland	Highland	NW¼ NE¼ NE¼	24	3 N/S.	7 E/W.

Distance And Direction from Road Intersection: 0 0

Street address & City of Well Location: 2336 W. Highland Rd - Highland

Locate with "X" in section below. Sketch Map:



3 OWNER OF WELL: Liddy, Lee Investment Co

Address

4 WELL DEPTH: (completed) 71 ft. **Date of Completion** 1-18-1979

5 ☒ Cable tool ☐ Rotary ☐ Driven ☐ Dug ☐ Hollow rod ☐ Jetted ☐ Bored ☐ ____

6 USE: ☐ Domestic ☐ Public Supply ☐ Industry ☐ Irrigation ☐ Air Conditioning ☒ Commercial ☐ Test Well ☐ ____

7 CASING: Threaded ☒ Welded ☐ Diam. 4" ____ in. to ____ ft. Depth ____ in. to ____ ft. Depth

Height: Above/Below Surface 1 ft. Weight 11 lbs./ft. Drive Shoe? Yes ☒ No ☐

8 SCREEN: Type Johnson Stainless Dia.: 4 Slot/Gauge 10 Length 4 Ft Set between 67 ft. and 71 ft. Fittings: K-Packer & Tail pipe

9 STATIC WATER LEVEL 30 ft. below land surface

10 PUMPING LEVEL below land surface 40 ft. after 1 hrs. pumping 40 g.p.m. 40 ft. after 1 hrs. pumping 40 g.p.m.

11 WATER QUALITY in Parts Per Million: Iron (Fe) ____ Chlorides (Cl) ____ Hardness ____ Other ____

12 WELL HEAD COMPLETION: ☐ In Approved Pit ☒ Pitless Adapter ☒ 12" Above Grade

13 Well Grouted? ☐ Yes ☐ No ☐ Neat Cement ☐ Bentonite ☐ ____ Depth: From ____ ft. to ____ ft.

14 Nearest Source of possible contamination 100 feet S Direction Septic Type. Well disinfected upon completion ☒ Yes ☐ No

15 PUMP: ☐ Not installed Manufacturer's Name Tart Model Number 5ST HP ½ Volts 230 Length of Drop Pipe 42 ft. capacity 10 G.P.M. Type: ☒ Submersible ☐ Jet ☐ Reciprocating

2 FORMATION	THICKNESS OF STRATUM	DEPTH TO BOTTOM OF STRATUM
Sand / clay	18	18
Sand / clay & Gravel	36	54
Sand / Gravel	10	64
Sand / water Bearing	7	71

APR 29 1980
USE 2ND SHEET IF NECESSARY

16 Remarks, elevation, source of data:

ADDED INFO BY DRILLER, ITEM #11
*CORRECTED BY
**ADDITION BY
ELEVATION
DEPTH TO ROCK

17 WATER WELL CONTRACTOR'S CERTIFICATION:
This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

Paul Zelony Well Drilling — REGISTERED BUSINESS NAME — 0311 REGISTRATION NO.

Address 4794 N Dixie Hwy - Highland

Signed Paul Zelony — AUTHORIZED REPRESENTATIVE — Date 1-21-79

D67d 100M (Rev. 12-68)

1 FEB 28 1980

WATER WELL RECORD
ACT 294 PA 1965

13

MICHIGAN DEPARTMENT OF PUBLIC HEALTH

1 LOCATION OF WELL

County	Township Name	Fraction	Section Number	Town Number	Range Number
Ceh	Highland	¼ NE ¼ NE ¼	24	3 N/S.	7 E/W.

Distance And Direction [redacted]

Locate with "X" in section below — Sketch Map: [redacted]

1 MILE

3 OWNER OF WELL:

Address

4 WELL DEPTH: (completed) 78' ft. Date of Completion 10-1-79

5
[X] Cable tool [ ] Rotary [ ] Driven [ ] Dug
[ ] Hollow rod [ ] Jetted [ ] Bored [ ] ______

6 USE:
[X] Domestic [ ] Public Supply [ ] Industry
[ ] Irrigation [ ] Air Conditioning [ ] Commercial
[ ] Test Well [ ] ______

7 CASING: Threaded [ ] Welded [X]
Diam. 4 in. to 78 ft. Depth
____ in. to ____ ft. Depth
Height: Above/Below Surface ____ ft.
Weight ____ lbs./ft.
Drive Shoe? Yes [X] No [ ]

2 FORMATION

FORMATION	THICKNESS OF STRATUM	DEPTH TO BOTTOM OF STRATUM
Clay & Sand	20	20
Gravel	12	32
Blue Clay	36	68
Sand & Gravel	10	78

USE A 2ND SHEET IF NEEDED

FEB 14 1980

8 SCREEN:
Type: Johnson Dia.: 4
Slot/Gauze 15 Length 4'
Set between 74 ft. and 78 ft.
Fittings:

9 STATIC WATER LEVEL
30 ft. below land surface

10 PUMPING LEVEL below land surface
42' ft. after ____ hrs. pumping 20+ g.p.m.
____ ft. after ____ hrs. pumping ____ g.p.m.

11 WATER QUALITY in Parts Per Million:
Iron (Fe) ____ Chlorides (Cl) ____
Hardness ____ Other ____

12 WELL HEAD COMPLETION:
[ ] In Approved Pit
[X] Pitless Adapter [X] 12" Above Grade

13 Well Grouted? [ ] Yes [ ] No
[ ] Neat Cement [ ] Bentonite [ ] ______
Depth: From ____ ft. to ____ ft.

14 Nearest Source of possible contamination
60 feet [illegible] Direction [illegible] Type
Well disinfected upon completion [X] Yes [ ] No

15 PUMP:
[ ] Not installed
Manufacturer's Name Red Jacket
Model Number 9AC-2 HP ½ Volts 220
Length of Drop Pipe 47 ft. capacity 10 G.P.M.
Type: [X] Submersible
[ ] Jet [ ] Reciprocating

16 Remarks, elevation, source of data, etc.

ADDED INFO BY DRILLER, ITEM NO.
*CORRECTED BY MB
**ADDITION BY
ELEVATION
DEPTH TO ROCK

17 WATER WELL CONTRACTOR'S CERTIFICATION:
This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

[illegible] 1151
REGISTERED BUSINESS NAME — REGISTRATION NO.

Address 840 N. [illegible]

Signed [illegible] Date 10-26-79
AUTHORIZED REPRESENTATIVE

D67d 100M (Rev. 12-68)

GEOLOGICAL SURVEY COPY

APR 29 1980

WATER WELL RECORD
ACT 294 PA 1965

MICHIGAN DEPARTMENT OF PUBLIC HEALTH

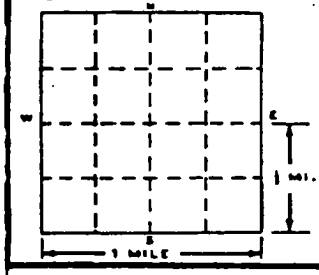
1 LOCATION OF WELL

County	Township Name	Fraction	Section Number	Town Number	Range Number
Oakland	Highland	NW¼ SW¼ NE¼	24	3 N/S.	7 E/W.

Distance And Direction from Road Intersections

Street address & City of Well Location

Locate with "X" in section below — Sketch Map:



3 OWNER OF WELL:

Address

4 WELL DEPTH: (completed) 63 ft. — Date of Completion 9-13-1979

5 ☒ Cable tool ☐ Rotary ☐ Driven ☐ Dug ☐ Hollow rod ☐ Jetted ☐ Bored ☐ ____

6 USE: ☒ Domestic ☐ Public Supply ☐ Industry ☐ Irrigation ☐ Air Conditioning ☐ Commercial ☐ Test Well ☐

7 CASING: Threaded ☒ Welded ☐ Diam. 4 11 in. to ____ ft. Depth; ____ in. to ____ ft. Depth. Height: Above/Below Surface 1 ft. Weight 11 lbs./ft. Drive Shoe? Yes ☒ No ☐

2 FORMATION	THICKNESS OF STRATUM	DEPTH TO BOTTOM OF STRATUM
Sand/clay	18	18
Sand/clay/Gravel	36	54
Sand/Gravel/water Bearing	9	63

8 SCREEN: Type: Johnson Stainless Dia.: 4 Slot/Gauze 10 Length 4 ft Set between 59 ft. and 63 ft. Fittings: K-Packer - Tail pipe

9 STATIC WATER LEVEL 30 ft. below land surface

10 PUMPING LEVEL below land surface: 35 ft. after 1 hrs. pumping 35 g.p.m. ____ ft. after ____ hrs. pumping ____ g.p.m.

11 WATER QUALITY in Parts Per Million: Iron (Fe) ____ Chlorides (Cl) ____ Hardness ____ Other ____

12 WELL HEAD COMPLETION: ☐ In Approved Pit ☒ Pitless Adapter ☒ 12" Above Grade

13 Well Grouted? ☐ Yes ☐ No ☐ Neat Cement ☐ Bentonite ☐ ____ Depth: From ____ ft. to ____ ft.

14 Nearest Source of possible contamination: 65 feet S Direction Septic Type. Well disinfected upon completion ☒ Yes ☐ No

15 PUMP: ☐ Not installed. Manufacturer's Name Jant. Model Number 7EC HP ¾ Volts 230. Length of Drop Pipe 42 ft. capacity 10 G.P.M. Type: ☒ Submersible ☐ Jet ☐ Reciprocating

RECEIVED APR 21 1980

USE ADD'L SHEET IF NEEDED

16 Remarks, elevation, source of data, etc.

ADDED INFO BY DRILLER ITEM 16
CORRECTED BY
ADDITION BY MB
ELEVATION
DEPTH TO ROCK

17 WATER WELL CONTRACTOR'S CERTIFICATION:

This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

Paul Zelony Well Drilling 0311
REGISTERED BUSINESS NAME — REGISTRATION NO.

Address 4794 N. Duck Lk Rd.

Signed Paul Zelony Date 9-16-79
AUTHORIZED REPRESENTATIVE

D67d 100M (Rev. 12-68)

GEOLOGICAL SURVEY COPY

WATER WELL RECORD

ACT 294 PA 1965

MICHIGAN DEPARTMENT OF PUBLIC HEALTH

1 LOCATION OF WELL

County	Twp.	Fraction	Section No.	Town	Range
Oakland	Highland	NW¼ NW¼ NW¼	27	T-3 N/S.	R7E E/W.

D ...ance And Direction from Road Intersection

S... et address & City of Well Location

OWNER No.

3 OWNER OF WELL

Address

2 FORMATION	THICKNESS OF STRATUM	DEPTH TO BOTTOM OF STRATUM
0-40 - Sand - yellow fine	40	40
40-50 - Sand - White Coarse	10	50
50-65 - Coarse water Sand	15	65

4 WELL DEPTH: (completed) 65 ft. **Date of Completion** 6-10-1967

5 ☒ Cable tool ☐ Rotary ☐ Driven ☐ Dug ☐ Hollow rod ☐ Jetted ☐ Bored ☐ ___

6 USE: ☐ Domestic ☐ Public Supply ☐ Industry ☐ Irrigation ☐ Air Conditioning ☐ Commercial ☐ Test Well ☒ apts

7 CASING: Diam. 4 in. to ___ ft. Depth; Threaded ☒ Welded ☐; Height: Above/Below surface [illegible] ft.; Weight 11 lbs/ft.; ___ in. to ___ ft. Depth; Drive Shoe? Yes ☒ No ☐

8 SCREEN:

Type: 10 Dia.: 3"

Slot/Gauze: Slotted Length: 4 ft

Set between 64 ft. and 65 ft.

Fittings: K-Packer - Iron - Blank

9 STATIC WATER LEVEL

25 ft. below land surface

10 PUMPING LEVEL below land surface

25 ft. after 1 hrs. pumping 45 g.p.m.

25 ft. after 1 hrs. pumping 45 g.p.m.

11 WATER QUALITY in Parts Per Million:

Iron (Fe) ___ Chlorides (Cl) ___

Hardness ___

12 WELL HEAD COMPLETION: ☐ In Approved Pit ☒ Pitless Adapter ☒ 12" Above Grade

13 GROUTING:

Well Grouted? ☐ Yes ☒ No

Material: ☐ Neat Cement ☐ ___

Depth: From ___ ft. to ___ ft.

14 SANITARY:

Nearest Source of possible contamination

75 feet W Direction Septic Type

Well disinfected upon completion ☒ Yes ☐ No

15 PUMP:

Manufacturer's Name Tait

Model Number A-10-A412 HP 1

Length of Drop Pipe 42 ft. capacity 20 G.P.M.

Type: ☒ Submersible ☐ ___ ☐ Jet ☐ Reciprocating

16 Remarks, elevation, source of data, etc.

ADDED INFO. BY DRILLER, ITEM NO.

CORRECTED BY:

EQUIPMENT BY:

17 WATER WELL CONTRACTOR'S CERTIFICATION:

This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

Paul Zelony Well Drilling 0311

REGISTERED BUSINESS NAME REGISTRATION NO.

Address 4794 N. Dixie Hwy.

Signed Paul Zelony Date 6-30-67

AUTHORIZED REPRESENTATIVE

L-7D 100M 6-66

MAR 3 1969

...LOGICAL SURVEY COPY

23

WATER WELL RECORD
ACT 294 PA 1965

MICHIGAN DEPARTMENT OF PUBLIC HEALTH

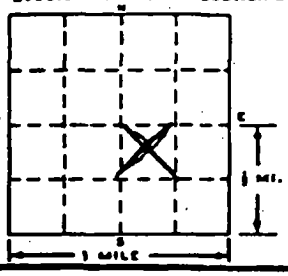
1 LOCATION OF WELL

County	Township Name	Fraction	Section Number	Town Number	Range Number
OAKLAND	Highland	SE SW	27	3 N/S	7 E/W

Distance And Direction from Road Intersections: [redacted]

Street address & City of Well Location: [redacted]

Locate with "X" in section below



Sketch Map: [redacted]

3 OWNER OF WELL:

Address: [redacted]

4 WELL DEPTH: (Completed) Date of Completion

73 ft.

5 ☒ Cable tool ☐ Rotary ☐ Driven ☐ Dug ☐ Hollow rod ☐ Jetted ☐ Bored ☐ ____

6 USE: ☒ Domestic ☐ Public Supply ☐ Industry ☐ Irrigation ☐ Air Conditioning ☐ Commercial ☐ Test Well ☐

7 CASING: Threaded ☒ Welded ☐ Diam. 4 in. to 70 ft. Depth; ____ in. to ____ ft. Depth

Height: Above/Below Surface 1 ft. Weight 11 lbs/ft. Drive Shoe? Yes ☒ No ☐

2 FORMATION	THICKNESS OF STRATUM	DEPTH TO BOTTOM OF STRATUM
SAND	16	18
CLAY	51	69
WATER GRAVEL	4	73

USE A 2ND SHEET IF NEEDED

8 SCREEN: Type: STAINLESS Dia.: 3 1/8

Slot/Gauze .020 Length 5.0

Set between 70 ft. and 73 ft.

Fittings: K PACKER

9 STATIC WATER LEVEL

39 ft. below land surface

10 PUMPING LEVEL below land surface

50 ft. after 4 hrs. pumping 20 g.p.m.

____ ft. after ____ hrs. pumping ____ g.p.m.

11 WATER QUALITY in Parts Per Million:

Iron (Fe) ____ Chlorides (Cl) ____

Hardness ____ Other ____

12 WELL HEAD COMPLETION: ☐ In Approved Pit ☒ Pitless Adapter ☐ 12" Above Grade

13 Well Grouted? ☒ Yes ☐ No ☐ Neat Cement ☐ Bentonite ☐ ____

Depth: From ____ ft. to ____ ft.

14 Nearest Source of possible contamination 75 feet W Direction SEPTIC Type

Well disinfected upon completion ☒ Yes ☐ No

15 PUMP: ☐ Not installed

Manufacturer's Name RED JACKET

Model Number 4 HP 1/2 Volts 220

Length of Drop Pipe 66 ft. capacity 15 G.P.M.

Type: ☒ Submersible ☐ Jet ☐ Reciprocating

16 Remarks, elevation, source of data, etc.

17 WATER WELL CONTRACTOR'S CERTIFICATION:

This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

THOMAS R FORSTER 0781
REGISTERED BUSINESS NAME REGISTRATION NO.

Address 1225 WHITE LAKE RD

Signed [signature] AUTHORIZED REPRESENTATIVE Date July 8 1970

D67d 100M (Rev. 12-68)

SEP 21 1981

WATER WELL RECORD
ACT 294 PA 1965

MICHIGAN DEPARTMENT OF PUBLIC HEALTH

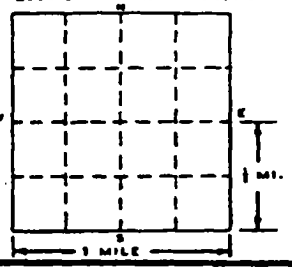
1 LOCATION OF WELL

County	Township Name	Fraction	Section Number	Town Number	Range Number
Oakland	Highland	SW¼ NE¼ NW¼	27	3 N/S.	7 E/W.

Distance And Direction from Road Intersections

Street address & City of Well Location

Locate with "X" in section below



Sketch Map:

[redacted]

3 OWNER OF WELL:
Address [redacted]

4 WELL DEPTH: (completed) Date of Completion
74' ft. July/81

5 ☒ Cable tool ☐ Rotary ☐ Driven ☐ Dug
☐ Hollow rod ☐ Jetted ☐ Bored ☐ ____

6 USE: ☐ Domestic ☒ Public Supply ☐ Industry
☐ Irrigation ☐ Air Conditioning ☐ Commercial
☐ Test Well ☐ ____

7 CASING: Threaded ☐ Welded ☒ Height: Above/Below Surface 1 ft.
4 in. to 74 ft. Depth Weight 10.79 lbs./ft.
___ in. to ___ ft. Depth Drive Shoe? Yes ☒ No ☐

2 FORMATION	THICKNESS OF STRATUM	DEPTH TO BOTTOM OF STRATUM
Brown Sand	31	31
Brown sand & Clay	8	37
Brown Sand & Gravel	6	43
Blue Clay, Sand & Gravel	21	64
Fine Sand & Gravel	8	72
Water Bearing Gravel	2	74

USE A 2ND SHEET IF NEEDED

8 SCREEN:
Type: /Gravel Dia.: ____
Slot/Gauze ____ Length ____
Set between ____ ft. and ____ ft.
Fittings:

9 STATIC WATER LEVEL
15 ft. below land surface

10 PUMPING LEVEL below land surface
15 ft. after 2 hrs. pumping 30 g.p.m.
____ ft. after ___ hrs. pumping ____ g.p.m.

11 WATER QUALITY in Parts Per Million:
Iron (Fe) ____ Chlorides (Cl) ____
Hardness ____ Other ____

12 WELL HEAD COMPLETION: ☐ In Approved Pit
☒ Pitless Adapter ☐ 12" Above Grade

13 Well Grouted? ☐ Yes ☒ No
☐ Neat Cement ☐ Bentonite ☐ ____
Depth: From ____ ft. to ____ ft.

14 Nearest Source of possible contamination
75 feet S Direction Septic Type
Well disinfected upon completion ☒ Yes ☐ No

15 PUMP: ☐ Not installed
Manufacturer's Name Sta Rite
Model Number 20P4D02S HP 3/4 Volts 230
Length of Drop Pipe 45 ft. capacity 20 G.P.M.
Type: ☒ Submersible
☐ Jet ☐ Reciprocating

16 Remarks, elevation, source of data, etc.

ADDED INFO. BY DRILLER, ITEM #4.
CORRECTED BY: D.R.L.

17 WATER WELL CONTRACTOR'S CERTIFICATION:
This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

James N. Layman 0645
REGISTERED BUSINESS NAME REGISTRATION NO.

Address 10275 Eagle Rd. Davisburg, MI 48019

Signed James N. Layman Date 7/30/81
AUTHORIZED REPRESENTATIVE

D67d 100M (Rev. 12-68) SUPERSEDES PREVIOUS EDITION WHICH MAY BE USED

GEOLOGICAL SURVEY COPY

2.

APR 30 19

WATER WELL RECORD

ACT 294 PA 1965

NW NW NW

MICHIGAN DEPARTMENT OF PUBLIC HEALTH

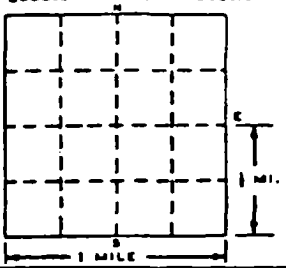
1 LOCATION OF WELL

County	Township Name	Fraction	Section Number	Town Number	Range Number
Oakland	Highland	NE NE SW ¼	27	3 N/S.	7 E/W.

Distance And Direction from Road Intersections

Street address & City of Well Location

Locate with "X" in section below — Sketch Map:



3 OWNER OF WELL:

Address

4 WELL DEPTH: (completed) 54 ft. — Date of Completion 1-3-81

5 ☐ Cable tool ☐ Rotary ☐ Driven ☐ Dug ☐ Hollow rod ☒ Jetted ☐ Bored ☐ ____

6 USE: ☒ Domestic ☐ Public Supply ☐ Industry ☐ Irrigation ☐ Air Conditioning ☐ Commercial ☐ Test Well ☐ ____

7 CASING: Threaded ☒ Welded ☐ Diam. 2" ____in. to ____ft. Depth ____in. to ____ft. Depth

Height: Above/Below Surface ____ft. Weight ____lbs./ft. Drive Shoe? Yes ☒ No ☐

2 FORMATION	THICKNESS OF STRATUM	DEPTH TO BOTTOM OF STRATUM
Sand / Gravel	21	21
Sand / Gravel / S water	21	42
Sand / Gravel / water Bearing	12	54

8 SCREEN: Type Johnson Stainless Dia.: 1¼ Slot Gauze 10 Length 3ft Set between 51 ft. and 54 ft.

Fittings: Brass check & foot pipe

9 STATIC WATER LEVEL 20 ft. below land surface

10 PUMPING LEVEL below land surface

20 ft. after ½ hrs. pumping 15 g.p.m.

20 ft. after ½ hrs. pumping 15 g.p.m.

11 WATER QUALITY in Parts Per Million:

Iron (Fe) ____ Chlorides (Cl) ____

Hardness ____ Other ____

12 WELL HEAD COMPLETION: ☐ In Approved Pit ☒ Pitless Adapter ☒ 12" Above Grade

13 Well Grouted? ☐ Yes ☐ No ☐ Neat Cement ☐ Bentonite ☐ ____

Depth: From ____ft. to ____ft.

14 Nearest Source of possible contamination 60 feet S Direction Septic Type

Well disinfected upon completion ☒ Yes ☐ No

15 PUMP: ☐ Not installed

Manufacturer's Name J & W

Model Number SP05 HP ½ Volts 110

Length of Drop Pipe 30 ft. capacity 10 G.P.M.

Type: ☐ Submersible ☒ Jet ☐ Reciprocating

USE A 2ND SHEET IF NEEDED

16 Remarks, elevation, source of data, etc.

ADDED INFO BY DRILLER, ITEM NO.
*CORRECTED BY
**ADDITION BY
ELEVATION
DEPTH TO ROCK

dw

17 WATER WELL CONTRACTOR'S CERTIFICATION:

This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

Paul Zelony Well Drilling 0311

REGISTERED BUSINESS NAME — REGISTRATION NO.

Address 4794 N Duck Lk Rd Highland

Signed Paul Zelony Date 1-6-81

AUTHORIZED REPRESENTATIVE

D67d 100M (Rev. 12-68)

GEOLOGICAL SURVEY COPY

WATER WELL RECORD
ACT 294 PA 1965

MICHIGAN DEPARTMENT OF PUBLIC HEALTH

LOCATION OF WELL

County	Twp.	Fraction	Section No.	Town	Range
Oakland	Highland	NE¼ SW¼ SW¼	2	3 N/S	7 E/W

Distance And Direction from Road Intersection [illegible] OWNER No.

Street address & City of Well Location

FORMATION	THICKNESS OF STRATUM	DEPTH TO BOTTOM OF STRATUM
Yellow Sand	4'	4'
Red Sand	29'	33'
Water Sand	7'	40'
Water Gravel and Sand	20'	60'
Coarse Grave W/sand	16'	76'

3 OWNER OF WELL:
Address: Brady Plg and Heating
12758 Inkster
Detroit, Michigan 48239

4 WELL DEPTH: (completed) 76 ft. Date of Completion 5-26-69

5 ☒ Cable tool ☐ Rotary ☐ Driven ☐ Dug ☐ Hollow rod ☐ Jetted ☐ Bored ☐ ___

6 USE: ☐ Domestic ☒ Public Supply ☐ Industry ☐ Irrigation ☐ Air Conditioning ☐ Commercial ☐ Test Well ☐ ___

7 CASING: Diam. 6 in. to 66'-7" ft. Depth; Threaded ☒ Welded ☐; Height: Above surface 1'-5"; Weight 19.45 lbs/ft.; ___ in. to ___ ft. Depth; Drive Shoe? Yes ☒ No ☐

8 SCREEN: Johnson Stainless Steel
Type Top 60 Dia.: 6"
Bottom 60 Length 10'-1"
Set between 65 ft. and 76 ft.
Fittings: 5" x 17" Nipple

9 STATIC WATER LEVEL
23 ft. below land surface

10 PUMPING LEVEL below land surface
41 ft. after 8 hrs. pumping 230 g.p.m.
___ ft. after ___ hrs. pumping ___ g.p.m.

11 WATER QUALITY in Parts Per Million:
Iron (Fe) ___ Chlorides (Cl) ___
Hardness ___ NONE

12 WELL HEAD COMPLETION: ☐ In Approved Pit ☒ Pitless Adapter ☐ 12" Above Grade

13 GROUTING:
Well Grouted? ☐ Yes ☒ No
Material: ☐ Neat Cement ☐ ___
Depth: From ___ ft. to ___ ft.

14 SANITARY: UNKNOWN
Nearest Source of possible contamination
___ feet ___ Direction ___ Type
Well disinfected upon completion ☒ Yes ☐ No

15 PUMP:
Manufacturer's Name Jacuzzi
Model Number 10S6M4T2 HP 10
Length of Drop Pipe 46 ft. capacity 235 G.P.M.
Type: ☒ Submersible ☐ ___ ☐ Jet ☐ Reciprocating

16 Remarks, elevation, source of data, etc.
FOURTH ELEMENTARY SCHOOL IN MILFORD

ADDED INFO. BY DRILLER. ITEM NO.

CORRECTED BY:

ADDITION BY:

17 WATER WELL CONTRACTOR'S CERTIFICATION:
This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

O. O. Corsaut Inc. (REGISTERED BUSINESS NAME) 0025 (REGISTRATION NO.)

Address 15101 W. 11 Mile Road, Oak Park 48237

Signed [signature] (AUTHORIZED REPRESENTATIVE) Date July 9, 1969

D67D 100M 6-66

AUG [illegible] 1969 GEOLOGICAL SURVEY COPY

WATER WELL AND PUMP RECORD

PART 127 ACT 368 P A 1978

PERMIT NUMBER

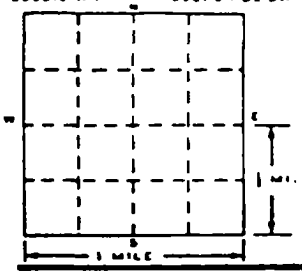
LOCATION OF WELL

County	Township Name	Fraction	Section Number	Town Number	Range Number
Oakland	Highland	¼ ¼ ¼	9	3 N/S	7 E/W

Distance And Direction From Road Intersection

Street Address of Well Location

Locate with "X" in Section Below — Sketch Map



3 OWNER OF WELL

Address

Address Same As Well Location? ☒ Yes ☐ No

4 WELL DEPTH (completed) 125 ft — Date of Completion

5 ☐ Cable tool ☒ Rotary ☐ Driven ☐ Dug ☐ Hollow rod ☐ Auger ☐ Jetted ☐

6 USE ☒ Domestic ☐ Type I Public ☐ Type III Public ☐ Irrigation ☐ Type Ia Public ☐ Heat pump ☐ Test Well ☐ Type IIb Public ☐

7 CASING Diameter ☒ Steel ☐ Threaded ☒ Plastic ☐ Welded

4 in to 120 ft depth

in to ft depth

Grouted Drill Hole Diameter

in to ft depth

in to ft depth

Height Above/Below Surface ft

Weight lbs /ft

Drive Shoe ☒ Yes ☐ No

8 SCREEN Johnson ☐ Not Installed

Type S/S W/W Diameter 4"

Slot/Gauze Length

Set between 35 ft and 125 ft

FITTINGS ☒ K-Packer ☐ Lead Packer ☐ Bremer Check

☐ Blank above screen ft Other

9 STATIC WATER LEVEL 30 ft below land surface ☐ Flow

10 PUMPING LEVEL below land surface

100 ft after 4/3 hrs pumping at 10 GPM

ft after hrs pumping at GPM

11 WELL HEAD COMPLETION ☐ Pitless adapter ☐ 12" above grade ☒ Basement offset ☐ Approved pit

12 WELL GROUTED? ☐ No ☐ Yes From to ft

☐ Neat cement ☐ Bentonite ☐ Other

No of bags of cement Additives

13 Nearest source of possible contamination

Type Septic Distance 75 ft Direction

Well disinfected upon completion ☒ Yes ☐ No

14 PUMP ☐ Not Installed ☐ Pump Installation Only

Manufacturer's name McDonald

Model number 10050K2 HP ½ Volts 230

Length of Drop Pipe 80 ft Capacity GPM

TYPE ☒ Submersible ☐ Jet

PRESSURE TANK

Manufacturer's name

Model number Capacity Gallons

2 FORMATION DESCRIPTION

FORMATION DESCRIPTION	THICKNESS OF STRATUM	DEPTH TO BOTTOM OF STRATUM
Sand & Gravel	35	35
Gray Clay & Gravel	83	118
Boulders & Gravel W Gray Clay	3	121
Course Angular Gravel	4	125
Gray Clay & Gravel		

USE A 2ND SHEET IF NEEDED

15 Remarks, elevation, source of data, etc

16. WATER WELL CONTRACTOR'S CERTIFICATION

This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief

REGISTERED BUSINESS NAME Layne Co., REGISTRATION NO 0026

Address Howell

Signed AUTHORIZED REPRESENTATIVE Date

(Rev 10-80)

APPENDIX E

MDNR INTEROFFICE COMMUNICATION - WELL DATA
(REF. 3)

INTEROFFICE COMMUNICATION

REFERENCE 7
SITE NAME Hi-Mill Manu
SITE ID MID005341714

To: Problem Evaluation Committee Subject: Hi-Mill Manufacturing

From: Ron Willson, Biology Section

Date: March 1, 1978

Hi-Mill Manufacturing has an aluminum annodizing process and fabricates tubular aluminum and copper parts. Nitric acid, sulfuric acid and dichromate solutions are utilized. Lead has been used in the past. Process wastes are discharged to a seepage lagoon which is adjacent to a marsh tributary to Waterbury Lake.

In April, 1972 staff investigated a complaint by employees expressing concern that two wells providing drinking water within the plant were contaminated by the seepage lagoon. Elevated copper (0.38 mg/l was found in the east well. All other parameters in both wells were normal. At the same time the adjacent marsh waters contained low pH and high levels of nitrates and copper.

Additional samples collected on October 9, 1975 showed high levels of nitrates, copper, aluminum, zinc and chrome in the marsh waters. Elevated nitrate, copper, nickel and aluminum in lake shore waters indicated movement of contaminants to Waterbury Lake.

A state groundwater permit was issued on October 31, 1975. Required monitoring wells were never installed. In Fall, 1976 a second lagoon was constructed without Water Quality Division approval. Direct overflows to the marsh occurred in December, 1976 and November, 1977.

A Notice of Noncompliance was issued on March 2, 1977 for failure to submit required monitoring reports. On March 15, 1977 the company was requested to apply for an NPDES permit. A proposed permit was issued on September 16, 1977. On November 18, 1977 U.S.-EPA informed the Water Quality Division that they could not concur with the issuance of an NPDES permit.

On December 13, 1977 Hi-Mills Manufacturing indicated an intent to implement a total recycle system and eliminate all waste discharges. A draft consent order requiring the elimination of all waste discharges, removal of lagoon waters and sludges and submission of a PIPP has been prepared and will be issued shortly.

Immediately following ice-out staff will sample company wells, lagoon waters and sludges, marsh waters and sediments and lake shoreline waters and sediments. Lagoon sample results will assist in assuring proper disposal of wastes in accordance with the proposed consent order. The well, marsh and lake samples are to broaden our information on previous ground and surface water contamination.

Recommendations

1. Staff should proceed in formalizing the seepage lagoon elimination, waste removal and PIPP preparation with the consent order.

2. Staff should perform the well, lagoon, marsh and lake samplings at the earliest opportunity.

3. The company should perform a hydrological survey of the site and provide analyses for pH, NH_3, NO_3, SO_4, Su, Ni, Al, Pb and Zn. To more accurately define the extent and severity of groundwater contamination.

RW:mm

APPENDIX F

MDNR STAFF REPORT - APRIL 1978 INVESTIGATION (REF. 4)

Water Quality Division
November 14, 1978

REFERENCE 11
SITE NAME Hi-Mill Manu
SITE ID MID005341714

STAFF REPORT

Investigation of Hi-Mill Manufacturing Treatment Facility,
Vicinity of Highland, Michigan, April 26, 1978

On April 26, 1978, Water Quality Division (WQD) staff conducted an investigation of Hi-Mill Manufacturing's waste treatment facility at the request of John Bohunsky, Chief of Field Operations, Water Quality Division. Hi-Mill Manufacturing is an aluminum anodizing plant which fabricates tubular aluminum and copper parts. The objective was to assess the impact their waste lagoon overflow has had on an adjacent marsh. The company had planned to eliminate their lagoon by March, 1978, but at the time of the survey they had not implemented the closed cycle system.

Summary and Conclusions

1. At the time of the survey, there was a direct overflow to the marsh from the lagoon. Water and sediment samples were collected from the company's well, lagoon and various locations in the adjacent marsh (Figure 1).

2. The water chemistry data (Table 1) showed elevated levels of nitrate-nitrite, ammonia, copper, zinc, and aluminum at all stations except the well sample (HM-2). No contamination of the company's well was indicated, however, the phosphorus level (1.76 mg/l) was unusually high. The elevated levels were a result of the lagoon overflow.

3. Sediment data (Table 2) indicated extremely high concentrations of copper, aluminum, and total chromium. Moderately elevated levels of zinc and lead were found in the lagoon and marsh. Copper and aluminum are used extensively in the company's process. Chromium, copper, zinc, and lead values were much higher than background data collected from Pontiac Lake, Oakland County (Table 2). These contaminated sediments could be a threat to waterfowl and shorebirds feeding in the marsh.

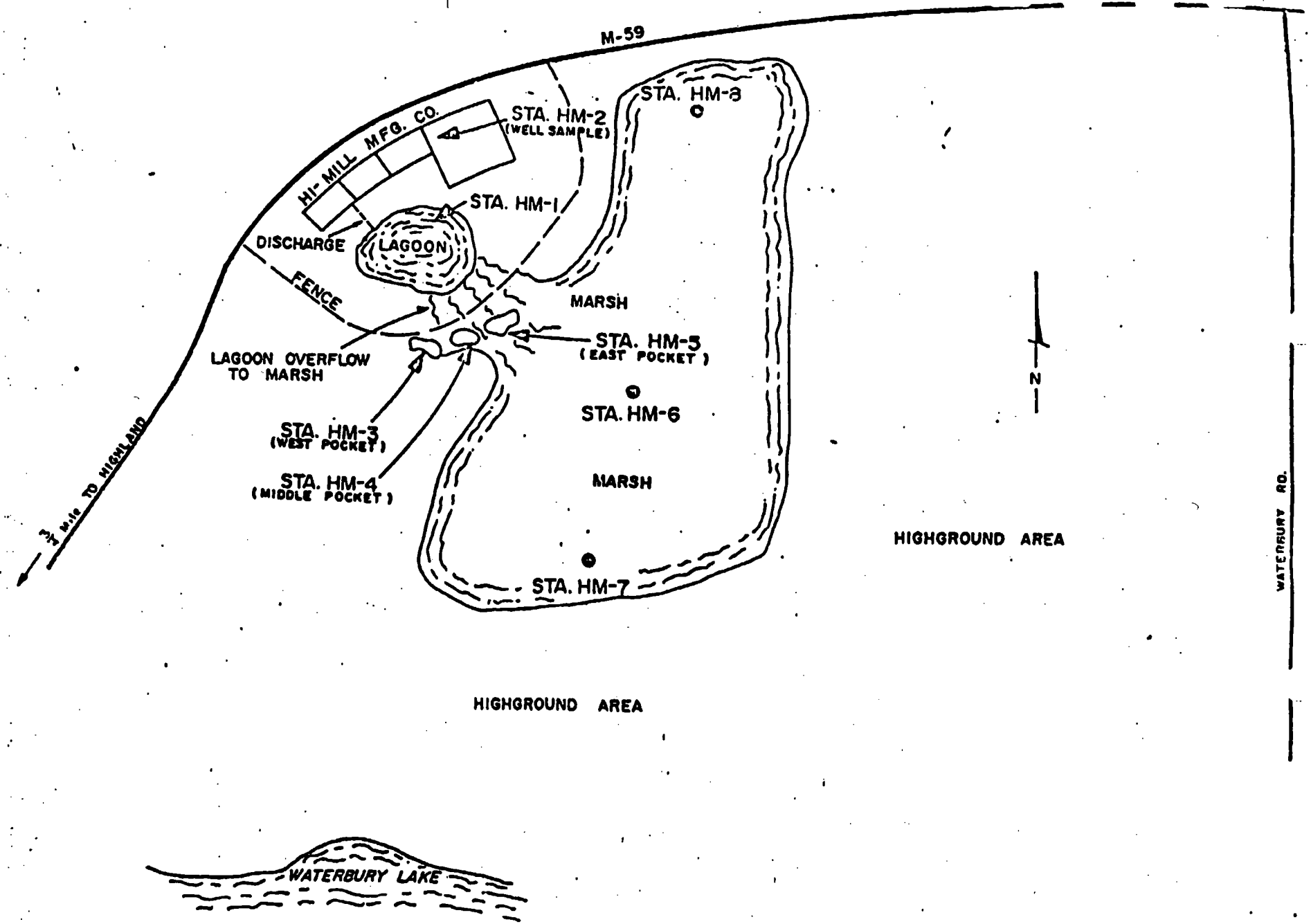
Recommendations

1. Hi-Mill Manufacturing should cease its discharge to the marsh and implement their total recycle system.

2. Lagoon water and sludges should be properly removed and the lagoon filled with inert fill.

Sediment and Water Chemistry By: Environmental Services Laboratory

Field Work and Report By: James Grant, Aquatic Biologist
Richard Lundgren, Aquatic Biologist
Biology Section


M-59
HI-MILL MFG. CO.
STA. HM-2
(WELL SAMPLE)
STA. HM-8
STA. HM-1
DISCHARGE
LAGOON
FENCE
MARSH
STA. HM-5
(EAST POCKET)
LAGOON OVERFLOW
TO MARSH
STA. HM-6
STA. HM-3
(WEST POCKET)
STA. HM-4
(MIDDLE POCKET)
MARSH
¾ MILE TO HIGHLAND
HIGHGROUND AREA
STA. HM-7
N
WATERBURY RD.
HIGHGROUND AREA
WATERBURY LAKE

T 1 Concentration of selected parameters in water samples collected from Hi-Mill Manufacturing's well and lagoon and from the marsh adjacent to the lagoon, vicinity of Highland, Oakland County, Michigan, on April 26, 1978. All values expressed in mg/l except pH.

Station Number	Station Location	Parameters												
		BOD	COD	pH	NO_2,NO_3	NH_3	Tot-P	SO_4	Tot Cr	Cu	Ni	Pb	Zn	Al
HM-1	Hi-Mill Lagoon Sample	7.2	27	4.9	160.	34.	0.88	128	4.0	30.	<.050	.070	14	60.
HM-2	Hi-Mill Well Sample	-	18	7.7	0.03	0.19	1.76	14	<.010	.010	<.050	<.050	<.010	<1.0
HM-3	West Pocket	-	-	7.1	33.	3.6	0.09	88	.060	.570	<.050	<.050	2.50	3.
HM-4	Middle Pocket	-	-	6.2	16.3	2.5	0.07	64	.050	.580	<.050	<.050	.620	3.
HM-5	East Pocket	-	-	7.4	152.	31.	0.12	140	.700	9.20	<.050	.070	8.90	34.
HM-6	Middle of Marsh	-	-	7.7	11.1	1.51	0.07	56	.010	.440	<.050	<.050	2.20	2.0

Table 2 Concentrations of selected parameters in sediments collected from Hi-Mill Manufacturing's lagoon and from the marsh adjecent to the lagoon on April 26, 1978 in the vicinity of Highland, Oakland County, Michigan. All values expressed in mg/kg except PCBs which are given in ug/kg (dry weight).

Station Number	Station Location	Parameters								
		TOT-Cr	Cu	Ni	Pb	Zn	Al	PCB 1242	PCB 1254	PCB 1260
HM-1	Hi-Mill Manufacturing Lagoon	2200	7800	43	110	650	29,000	<500	<500	<500
HM-3	West Pocket	310	2700	67	22	1700	51,000			
HM-4	Middle Pocket	1200	2300	52	37	120	27,000			
HM-5	East Pocket	570	5200	59	43	2000	51,000			
HM-6	Middle Marsh	1400	14,000	54	62	540	38,000			
HM-7	South end Marsh	870	21,000	53	110	1100	28,000			
HM-8	North end Marsh	8500	51,000	35	170	480	32,000			
Control	Pontiac Lake *	5.8	0.8	22	58	68				

* Unpublished data - Water Quality Division, MDNR - 1977

APPENDIX G

DEPARTMENT OF PUBLIC HEALTH LETTER - PROCESS WELL ANALYSES (REF. 5)

STATE OF MICHIGAN

JAMES J. BLANCHARD, Governor

DEPARTMENT OF PUBLIC HEALTH

3500 N. LOGAN
P.O. BOX 30035, LANSING, MICHIGAN 48909
GLORIA R. SMITH, Ph.D., M.P.H., F.A.A.N., Director

August 22, 1988

Mr. Dick Beard
Hi-Mill Manufacturing
1704 Highland Road
Highland, Michigan 48031

Dear Mr. Beard:

On July 14, 1988 a representative of the Oakland County Health Division and Michigan Department of Public Health collected water samples from your wells as a part of the groundwater monitoring program. Enclosed please find the laboratory report which lists the parameters tested, test results, standard health maximum contaminant level, if established, and minimum laboratory detection limits.

The results of the partial chemical analysis was satisfactory. The results of the volatile organic analysis revealed 0.004 mg/L benzene in well #1 and 0.001 mg/L trichloroethylene in well #2. The results of the metals analysis revealed 0.15 mg/L barium, 0.006 mg/L arsenic, and 2.0 mg/L iron in well #1 and 0.1 mg/L copper, 0.26 mg/L zinc, 0.007 mg/L lead, 6.5 mg/L iron, 0.19 mg/L barium, and 0.007 mg/L arsenic in well #2.

If you have any questions, feel free to contact Ron Holben at (517) 335-8329 or me at (517) 335-9175.

Sincerely,

Julie M. Parsons, Sanitarian
Ground Water Quality Control Section
Division of Water Supply
Bureau of Environmental and
Occupational Health

JMP:sll

CHEMICAL ANALYSIS OF WATER

Bureau of Laboratory and Epidemiological Services
Michigan Department of Public Health
3500 North Logan, P.O. Box 30035
Lansing, MI 48909
Telephone (517) 335-8184

Abbreviations: GT = Greater than given value
MCL = State regulated maximum contaminant limit

LAB NO.: 8807-02891 Page: 1
PROGRAM CODE: 22

REPORT TO

Water Supply Division-MDPH
3500 N Logan, Box 30035
Lansing, MI 48909

Date received: 07/18/88
Date reported: 07/22/88

Examiners in Charge:
T.J. Williams, Sect Chief
F.M. Saad, Assist Sect Chief

HMM FMSaad

SAMPLE SOURCE INFORMATION:
System Owner: HI-MILL #2
Street Address: 1704 HIGHLAND
City or Twp: HIGHLAND
County: OAKLA

WSSN:
Location/Source:
Collected by: PARSONS
Date Collected: 07/14/88

Test Name	Test Result	Standard Health MCL	Detection Test Limit
BROMOFORM	Not Detected	0.10mg/l	0.001mg/l
BROMOMETHANE	Not Detected		0.020mg/l
CARBON TETRACHLORIDE	Not Detected		0.001mg/l
CHLOROBENZENE	Not Detected		0.001mg/l
CHLORODIBROMOMETHANE	Not Detected	0.10mg/l	0.001mg/l
CHLOROETHANE	Not Detected		0.020mg/l
CHLOROFORM	Not Detected	0.10mg/l	0.001mg/l
CHLOROMETHANE	Not Detected		0.050mg/l
DICHLOROBROMOMETHANE	Not Detected	0.10mg/l	0.001mg/l
DICHLOROETHANE, 1,2-	Not Detected		0.001mg/l
DICHLOROETHANE, 1,1-	Not Detected		0.001mg/l
DICHLOROETHYLENE, TRANS-1,2,	Not Detected		0.001mg/l
DICHLOROETHYLENE, CIS-1,2,	Not Detected		0.001mg/l
DICHLOROPROPANE, 1,2-	Not Detected		0.001mg/l
DICHLOROPROPENE, trans-1,3-	Not Detected		0.001mg/l
DICHLOROPROPENE, cis-1,3-	Not Detected		0.001mg/l
ETHYLENE DIBROMIDE	Not Detected		0.001mg/l
FLUOROTRICHLOROMETHANE	Not Detected		0.010mg/l
HEXACHLOROETHANE	Not Detected		0.001mg/l
METHYLENE CHLORIDE	Not Detected		0.001mg/l
TETRACHLOROETHANE, 1,1,2,2-	Not Detected		0.001mg/l
TETRACHLOROETHYLENE	Not Detected		0.001mg/l
TOTAL TRIHALOMETHANES	Not Detected	0.10mg/l	0.001mg/l
TRICHLOROETHANE, 1,1,2-	Not Detected		0.001mg/l
TRICHLOROETHANE, 1,1,1-	Not Detected		0.001mg/l
TRICHLOROETHYLENE	0.001mg/l		
VINYL CHLORIDE	Not Detected		0.005mg/l
VINYLIDENE CHLORIDE	Not Detected		0.001mg/l
BENZENE	Not Detected		0.001mg/l
DICHLOROBENZENE, 1,4-	Not Detected		0.001mg/l
DICHLOROBENZENE, 1,3-	Not Detected		0.001mg/l

(CONTINUED)

CHEMICAL ANALYSIS OF WATER

Bureau of Laboratory and Epidemiological Services
Michigan Department of Public Health
3500 North Logan, P.O. Box 30035
Lansing, MI 48909
Telephone (517) 335-8184

Abbreviations: GT = Greater than given value
MCL = State regulated maximum contaminant limit

LAB NO.: 8807-02871 Page: 2
PROGRAM CODE: 22

REPORT TO:

Water Supply Division-MDPH
3500 N Logan, Box 30035
Lansing, MI 48909

Date received: 07/18/88
Date reported: 07/22/88

Examiners in Charge:
T.J. Williams, Sect Chief
F.N. Saad, Assist Sect Chief

SAMPLE SOURCE INFORMATION:
System Owner: HI-MILL #2
Street Address: 1704 HIGHLAND
City or Twp: HIGHLAND
County: OAKLA

WSSN:
Location/Source:
Collected by: PARSONS
Date Collected: 07/14/88

Test Name	Test Result	Standard Health MCL	Detection Test Limit
DICHLOROBENZENE, 1,2-	Not Detected		0.001mg/l
ETHYLBENZENE	Not Detected		0.001mg/l
METHYL ETHYL KETONE	Not Detected		0.020mg/l
METHYL ISOBUTYL KETONE	Not Detected		0.020mg/l
STYRENE	Not Detected		0.001mg/l
TOLUENE	Not Detected		0.001mg/l
XYLENE	Not Detected		0.001mg/l

F-31 2/83 By Authority of Act 368 PA 1978 as amended JUL 27 '88

CHEMICAL ANALYSIS OF WATER

Bureau of Laboratory and Epidemiological Services
Michigan Department of Public Health
3500 North Logan, P.O. Box 30035
Lansing, MI 48907
Telephone (517) 335-8184

Abbreviations: GT = Greater than given value
MCL State regulated maximum contaminant limit

LAB NO.: 3087-02087 Page: 1
PROGRAM CODE: 22

REPORT TO:

Date received: 07/18/88
Date reported: 07/22/88

Water Supply Division-MDPH
3500 N Logan, Box 30035
Lansing, MI 48909

Examiners in Charge:
T.J. Williams, Sect Chief
F.M. Saad, Assist Sect Chief

HMM

SAMPLE SOURCE INFORMATION:

System Owner: HI-MILL #1
Street Address: 1704 HIGHLAND
City or Twp: HIGHLAND
County: OAKLA

WSSN:
Location/Source:
Collected by: PARSONS
Date Collected: 07/14/88

Test Name	Test Result	Standard Health MCL	Detection Test Limit
BROMOFORM	Not Detected	0.10mg/l	0.001mg/l
BROMOMETHANE	Not Detected		0.020mg/l
CARBON TETRACHLORIDE	Not Detected		0.001mg/l
CHLOROBENZENE	Not Detected		0.001mg/l
CHLORODIBROMOMETHANE	Not Detected	0.10mg/l	0.001mg/l
CHLOROETHANE	Not Detected		0.020mg/l
CHLOROFORM	Not Detected	0.10mg/l	0.001mg/l
CHLOROMETHANE	Not Detected		0.050mg/l
DICHLOROBROMOMETHANE	Not Detected	0.10mg/l	0.001mg/l
DICHLOROETHANE, 1,2-	Not Detected		0.001mg/l
DICHLOROETHANE, 1,1-	Not Detected		0.001mg/l
DICHLOROETHYLENE, TRANS-1,2,	Not Detected		0.001mg/l
DICHLOROETHYLENE, CIS-1,2,	Not Detected		0.001mg/l
DICHLOROPROPANE, 1,2-	Not Detected		0.001mg/l
DICHLOROPROPENE,trans-1,3-	Not Detected		0.001mg/l
DICHLOROPROPENE,cis-1,3-	Not Detected		0.001mg/l
ETHYLENE DIBROMIDE	Not Detected		0.001mg/l
FLUOROTRICHLOROMETHANE	Not Detected		0.010mg/l
HEXACHLOROETHANE	Not Detected		0.001mg/l
METHYLENE CHLORIDE	Not Detected		0.001mg/l
TETRACHLOROETHANE, 1,1,2,2-	Not Detected		0.001mg/l
TETRACHLOROETHYLENE	Not Detected		0.001mg/l
TOTAL TRIHALOMETHANES	Not Detected	0.10mg/l	0.001mg/l
TRICHLOROETHANE, 1,1,2-	Not Detected		0.001mg/l
TRICHLOROETHANE, 1,1,1-	Not Detected		0.001mg/l
TRICHLOROETHYLENE	Not Detected		0.001mg/l
VINYL CHLORIDE	Not Detected		0.005mg/l
VINYLIDENE CHLORIDE	Not Detected		0.001mg/l
BENZENE	0.004mg/l		
DICHLOROBENZENE, 1,4-	Not Detected		0.001mg/l
DICHLOROBENZENE, 1,3-	Not Detected		0.001mg/l

(CONTINUED)

CHEMICAL ANALYSIS OF WATER

Bureau of Laboratory and Epidemiological Services
Michigan Department of Public Health
3500 North Logan, P.O. Box 30035
Lansing, MI 48909
Telephone (517) 335-8184

Abbreviations: GT = Greater than given value
MCL = State regulated maximum contaminant limit

LAB NO.: B807-02807 Page: 2
PROGRAM CODE: 22

REPORT TO:

Water Supply Division-MDPH
3500 N Logan, Box 30035
Lansing, MI 48909

Date received: 07/18/88
Date reported: 07/22/88

Examiners in Charge:
T.J. Williams, Sect Chief
F.M. Saad, Assist Sect Chief

F M Saad

SAMPLE SOURCE INFORMATION:

System Owner: HI-MILL #1
Street Address: 1704 HIGHLAND
City or Twp: HIGHLAND
County: OAKLA

WSSN:
Location/Source:
Collected by: PARSONS
Date Collected: 07/14/88

Test Name	Test Result	Standard Health MCL	Detection Test Limit
DICHLOROBENZENE, 1,2-	Not Detected		0.001mg/l
ETHYLBENZENE	Not Detected		0.001mg/l
METHYL ETHYL KETONE	Not Detected		0.020mg/l
METHYL ISOBUTYL KETONE	Not Detected		0.020mg/l
STYRENE	Not Detected		0.001mg/l
TOLUENE	Not Detected		0.001mg/l
XYLENE	Not Detected		0.001mg/l

CHEMICAL ANALYSIS OF WATER

Bureau of Laboratory and Epidemiological Services
Michigan Department of Public Health
3500 North Logan, P.O. Box 30035
Lansing, MI 48909
Telephone (517) 335-8184

Abbreviations: GT = Greater than given value
MCL = State regulated maximum contaminant limit

LAB NO.: 0007-02072 Page: 1
PROGRAM CODE: 22

REPORT TO:

Water Supply Division-MDPH
3500 N Logan, Box 30035
Lansing, MI 48909

Date received: 07/18/88
Date reported: 08/15/88

Examiners in Charge:
T.J. Williams, Sect Chief
F.M. Saad, Assist Sect Chief

HMM

SAMPLE SOURCE INFORMATION:

System Owner: HI MILL #1
Street Address: 1704 HIGHLAND
City or Twp: HIGHLAND
County: OAKLA

WSSN:
Location/Source:
Collected by:
Date Collected: 07/14/88

Test Name	Test Result	Standard Health MCL	Detection Test Limit
ALUMINUM	Not Detected	-	0.05mg/L
CHROMIUM, TOTAL	Not Detected	0.050mg/l	0.003mg/L
COPPER (RECOVERABLE)	Not Detected		0.1mg/L
ZINC (RECOVERABLE)	Not Detected	-	0.05mg/L
LEAD, TOTAL	Not Detected	0.050mg/l	0.003mg/L
IRON (RECOVERABLE)	2.0mg/L	-	
[illegible] TOTAL DISSOLVED	[illegible]	1.0mg/l	
ARSENIC, TOTAL	[illegible]	0.050mg/l	

CHEMICAL ANALYSIS - WATER

Bureau of Laboratories and Epidemiological Services
Michigan Department of Public Health
3500 North Logan, P.O. Box [illegible]
Lansing, MI 48909
Telephone (517) 335-[illegible]

Abbreviations: GT = Greater than given value
MCL = State regulated maximum contaminant limit

LAB NO.: 8837-3295 Page: 1
PROGRAM CODE: 22

REPORT TO:

Water Supply Division-MDPH
3500 N Logan, Box 30035
Lansing, MI 48909

Date received: 07/18/88
Date reported: 08/12/88

Examiners in Charge:
T.J. Williams, Sect Chief
F.M. Saad, Assist Sect Chief

HMM

SAMPLE SOURCE INFORMATION:
System Owner: HI-MILL #2
Street Address: 1704 HIGHLAND
City or Twp: HIGHLAND
County: OAKLA

PWSN:
Location/Source:
Collected by: PARSONS
Date Collected: 07/11/88

Test Name	Test Result	Standard Health MCL	Detection Test Limit
ALUMINUM	Not Detected	-	0.05mg/l
CHROMIUM, TOTAL	Not Detected	0.050mg/l	0.003mg/L
[illegible] (RECOVERABLE)	[illegible]		
[illegible] RECOVERABLE)	[illegible]	-	
[illegible] TOTAL	[illegible]	0.050mg/l	
IRON (RECOVERABLE)	6.5mg/L	-	
[illegible] TOTAL DISSOLVED	[illegible]	1.0mg/l	
[illegible] TOTAL	[illegible]	0.050mg/l	

AUG 17

PARTIAL CHEMICAL ANALYSIS OF WATER

Received: LANSING 1988 JUL 15 PM 2:51

Location Code (1-3): Him M

2848

Give all known information—Type or Print with soft lead or black ink. LAB NO.

1. Report Results: Div. of Water Supply, GWQCS, BE&OH — Phone No:
Street Address:
Post Office — State — Zip Code:

2. Reason for Analysis (check): ☐ Routine ☐ Other (Describe on separate sheet)

3. Supply Owner: Hi-Mill #1 — Phone No.

4. Sample Collected at—Street Address: 1704 Highland — Township: Highland — Section No.:

5. Sample Collected at—Post Office (MI), Zip Code: Highland — County: Oakland

6. Sample Collected by (name): Parsons — Time—24 hr. Format (4-7) HR MIN — Date: (8-13) MO DAY YR: 11 14 87

7. Sampling Point (circle): Faucet, pump, corp tap, other — Source (circle): Well, surface water — Well No. — Age (yrs.)—Depth (ft.)—Diam. (in.)

8. ☐ Check and complete following line only if sampling a public water supply.

9. Name of Supply: — WSSN (14-20) — Sample Type (21)

LAB ID (22-26) 00001 DO NOT WRITE BELOW—LABORATORY RESULTS

Code (27-30)	Parameter	*Result (31-34)
	LAB NO. 8807-02846 (1)	PROGRAM: 00
	IRON (AUTOMATED)	1.7mg/L
	SODIUM (AUTOMATED)	17mg/L
	NITRATE AS N (AUTOMATED)	Not Detected
	HARDNESS AS CaCO3 (AUTOMATED)	325mg/L
	CONDUCTIVITY (AUTOMATED)	635mhos
	CHLORIDE (AUTOMATED)	61mg/L
	FLUORIDE (AUTOMATED)	0.2mg/L

(*Unless otherwise indicated results given as mg/l)

Examiner

Date Reported (35-40): JUL 21 1988

Laboratory: MICHIGAN DEPARTMENT OF PUBLIC HEALTH

FB-32 8/84

By Authority of Act 368, P.A. 1978

PARTIAL CHEMICAL ANALYSIS OF WATER

Date Received: LANSING 1988 JUL 15 PM 2:51

Location Code (1-3): Him A

2853

Give all known information—Type or Print with soft lead or black ink. LAB NO.

1. Report Results to: Div. of Water Supply, GWQCS, BE&OH — Phone No:
Street Address:
Post Office — State — Zip Code:

2. Reason for Analysis (check): ☐ Routine ☐ Other (Describe on separate sheet)

3. Supply Owner: Hi Mill #2 — Phone No.

4. Sample Collected at—Street Address: 1704 Highland — Township: Highland — Section No.:

5. Sample Collected at—Post Office (MI), Zip Code: Highland — County: Oakland

6. Sample Collected by (name): Parsons — Time—24 hr. Format (4-7) HR MIN — Date: (8-13) MO DAY YR: 11 14 87

7. Sampling Point (circle): Faucet, pump, corp tap, other — Source (circle): Well, surface water — Well No. — Age (yrs.)—Depth (ft.)—Diam. (in.)

8. ☐ Check and complete following line only if sampling a public water supply.

9. Name of Supply: — WSSN (14-20) — Sample Type (21)

LAB ID (22-26) 00001 DO NOT WRITE BELOW—LABORATORY RESULTS

Code (27-30)	Parameter	*Result (31-34)
	LAB NO. 8807-02853 (1)	PROGRAM: 00
	IRON (AUTOMATED)	1.1mg/L
	SODIUM (AUTOMATED)	16mg/L
	NITRATE AS N (AUTOMATED)	Not Detected
	HARDNESS AS CaCO3 (AUTOMATED)	335mg/L
	CONDUCTIVITY (AUTOMATED)	629umhos
	CHLORIDE (AUTOMATED)	66mg/L
	FLUORIDE (AUTOMATED)	0.1mg/L

(*Unless otherwise indicated results given as mg/l)

Examiner

Date Reported (35-40): JUL 21 1988

Laboratory: MICHIGAN DEPARTMENT OF PUBLIC HEALTH

FB-32 8/84

By Authority of Act 368, P.A. 1978

APPENDIX H

BIOLOGICAL AND CHEMISTRY SURVEY REPORT (REF. 6)

KS-8410-050

REFERENCE 10
SITE NAME Hi-Mill Manu
SITE ID MID005341714

Michigan Department of Natural Resources
Surface Water Quality Division
Water Quality Surveillance Section
February 1985

A Biological and Water and Sediment Chemistry Survey of Waterbury Lake and Adjacent Marsh Oakland County, Michigan April 26, 1984

Introduction

Surface Water Quality Division staff of the Water Quality Surveillance Section surveyed Waterbury Lake and a marsh east of Hi Mill Manufacturing Company to determine the potential impact of Hi Mill Manufacturing Company discharge on these water bodies (Figure 1). The survey was performed at the request of Hakim Shakir, Detroit District Groundwater Quality Division staff in connection with the groundwater cleanup operation at Hi Mill Manufacturing.

Conclusions

1. Waterbury Lake was not connected with the marsh east of Hi Mill Manufacturing and was not impacted by Hi Mill Manufacturing surface water discharges.

2. Marsh waters generally contained higher concentrations of heavy metals than the background stations in Waterbury Lake.

3. Concentrations of copper in marsh waters exceeded the chronic criteria for warmwater species of freshwater aquatic life.

4. Sediment heavy metal concentrations in the marsh exceeded background concentrations in Waterbury Lake and in many cases mean concentrations downstream of industrial and municipal discharges.

5. Algae and zooplankton were abundant in marsh waters but bottom dwelling organisms were limited to pollution tolerant forms. The lack of additional species may be due to limited water in the dry season or the nutrient enriched condition of the marsh waters.

Recommendations

1. Minimize the sources of heavy metals entering the marsh from the Hi Mill parking lot and roof drainage system.

2. Continue to fill the existing lagoon.

3. Determine if contaminated groundwater should be purged.

Background

Hi Mill Manufacturing has an aluminum annodizing process and fabricates aluminum and copper parts. Process wastes are discharged to seepage lagoons adjacent to the marsh east of their property. In 1972 elevated levels of copper were found in the adjacent marshland and one of the company's drinking water wells (SWQD File, Hi Mill Mfg. Co.). In 1975 additional water samples collected in the marsh revealed elevated concentrations of nitrates, copper, aluminum, zinc and chromium. File reviews showed lagoon overflows had apparently been occurring and in April of 1978 additional water and sediment sampling was completed in the lagoon and marsh. Recommendations were made to remove lagoon wastes and sludges and fill the lagoon (Grant, 1978). None of the recommendations were accomplished, but no additional discharges were made to the lagoon after 1978. Hi Mill Manufacturing attempted to evaporate the lagoon liquid by spraying it into the air from the top of their building. This resulted in liquids entering the marsh through their roof and parking lot drain system. Groundwater samples collected in 1981 showed migration of elevated concentrations of aluminum, chromium, copper and zinc in the shallow water table (3 to 7 feet) and into the marsh (Sibo, 1982). As of November 1983, lagoon liquids and sludges had been removed and the lagoon itself was being filled.

Methods

Water and sediments for chemical analysis were collected and preserved according to "Quality Assurance for Water and Sediment Sampling" (MDNR 1981) and returned to the Environmental Laboratory in Lansing for analysis. Benthic macroinvertebrates were collected with a petite ponar dredge grab sampler and sieved through a number 30 mesh sieve. Organisms were identified with the naked eye on site and their abundance qualitatively assessed and recorded on stream problem assessment cards (Appendix A). Phytoplankton samples were qualitatively collected with a 64 micron mesh phytoplankton net towed at approximately a 45 degree angle, washed into a vial and returned to the Lansing Biological Laboratory and identified under the microscope at 400x power.

Water

Marshwater samples collected in 1984 contained lower concentrations of heavy metals than marshwaters at similar areas in 1978. However, concentrations of zinc, chromium, and copper were greater than those at the background location sampled in nearby Waterbury Lake. These data suggest that while heavy metal concentrations are decreasing in the marsh water they may still be leaching from the sediments into the water or continuing to enter from surface water discharges or contaminated groundwater. Neither chromium or zinc exceeded the criteria for freshwater aquatic life but the concentration of copper in the marsh water exceeded the chronic criteria (33 ug/l) for warmwater fish. Concentrations of total copper, zinc, chromium, and aluminum in the parking lot and roof

drainage were lower than the mid-marsh samples taken in 1978, but higher than marsh samples collected in 1984 indicating a continuing source of metals to the marsh. The copper concentration in the parking lot and roof drainage water exceeded both the acute and the chronic criteria for aquatic life. Contaminated groundwater resulting from the old seepage lagoons may also be contributing to heavy metals concentrations in marsh waters.

Sediments

Heavy metals in marsh and parking lots and roof runoff drainage sediments were higher than sediments collected in nearby Waterbury Lake Station 4 (Table 2). Total aluminum, total copper, total zinc and total cadmium were an order of magnitude higher while total chromium was two orders of magnitude higher in the marsh than in Waterbury Lake. These data suggest direct inputs of these metals to the marsh system from Hi Mill Manufacturing Company. Sediment total iron, total arsenic, total lead, total manganese and total lithium were also higher in the marsh than in Waterbury Lake. Mercury was detected only in the parking lot and roof drain outfall sediments. Concentrations of heavy metals in the marsh exceed the average concentrations downstream of industrial and municipal locations (Hesse and Evans 1972). It is not known if these sediment metals are leaching into the water column or are causing toxicity to aquatic insects, but bottom dwelling aquatic organisms were limited to tolerant midges in the marsh.

Aquatic Organisms

Only midges were found in the ponar grab samples collected in the marsh. These organisms are generally considered pollution tolerant. No other benthic aquatic insects were noted. The limited bottom dwelling community may be due to marsh water fluctuation (i.e., it may dry up in the summer) or it may be due to elevated concentrations of one or more heavy metals. Zooplankton were present at Stations 1 and 2. Daphnia sp. were very abundant at Station 2 nearest the old lagoon discharge where concentrations of copper in the water exceeded the criterion for aquatic life. It may be that these organisms blew in from another part of the marsh where copper was less concentrated. Other possibilities are that organic materials in the water column bound these copper molecules or that hardness and pH conditions created conditions reducing its toxicity. Daphnia are generally considered sensitive to relatively low copper concentration (Creal and Basch, 1981).

Only one fish was seen. A mudminnow was present near the outlet from the parking lot and roof runoff drainage system. The fish was dead with no evident cause. Mudminnows are tolerant of a wide variety of environmental conditions.

The presence of a variety of filamentous (Spirogyra) green algae, flagellates (Euglena) and other algae (Scenedesmus) Oocystis, Synedra, Oscillatoria and Mougeotia) and macrophytes (Typha, Scirpus, Lemna minor, Elodea and Potamogeton) indicated that the discharge did not have much impact on these aquatic plants (Table 3).

Literature Cited

Creal, W. and R. Basch. 1981, Water quality-Based Effluent LImits for Heavy Metals and Cyanide, MDNR, 124 p.

Environmental Protection Bureau, Michigan Department of Natural Resources, 1981, Quality Assurance Manual for Water and Sediment Chemistry.

Grant, 1978, Investigation of Hi Mill Manufacturing Treatment Facility, Vicinity of Highland, Michigan, April 26, 1978.

Hesse, J. N., and E. Evans, 1972, Heavy Metals of Surface Water, Sediments and Fish in Michigan. Michigan MDNR, 58 pp.

Sibo, K., 1982. A Hydrogeological Study of the Vicinity of Hi MIll Manufacturing, Highland, Michigan Department of Natural Resources.

Surface Water Quality Division Files for Hi Mill Manufacturing. MDNR.

Survey By: John Wuycheck, Aquatic Biologist
Dave Kenaga, Aquatic Biologist

Lab Analysis By: Environmental Lab

Algal Analysis By: Carey Johnson

Report By: David Kenaga, District Aquatic Biologist
Michigan Department of Natural Resources
Water Quality Surveillance Section
Surface Water Quality Division

Figure 1. Location of surface water and sediment samples collected in the vicinity of the Hi-Mill Manufacturing Co., Grand County, Michigan, April 24, 1984

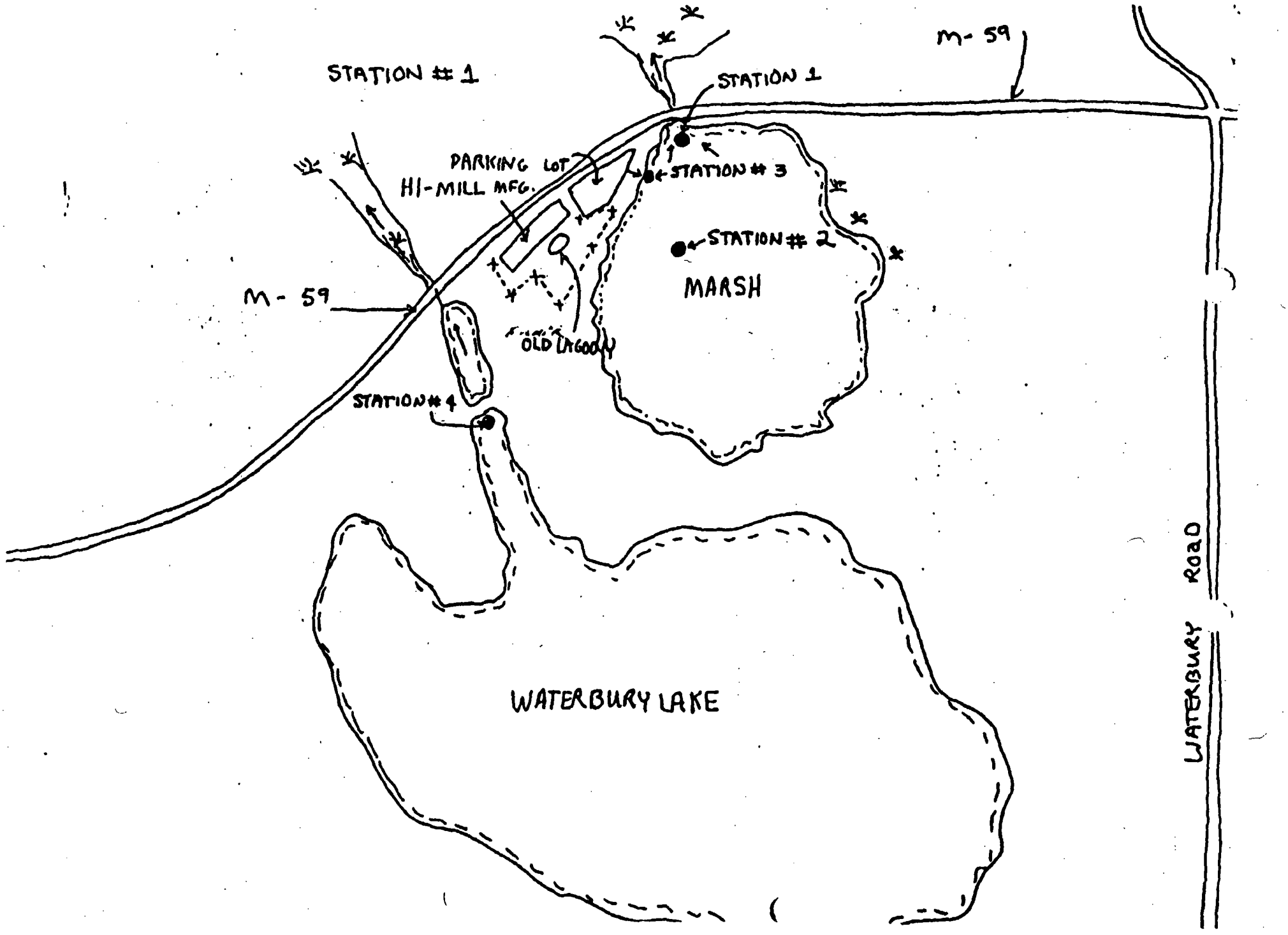


Table 1. Concentrations of selected heavy metals in water in the vicinity of Hi-Hill Manufacturing Company, April 26, 1984. Results in µg/l. (1978 Results from Grant 1978)

Location Sampled	Total Aluminum	Total Arsenic	Total Iron	Total Mercury	Total Zinc	Total Cadmium	Total Chromium	Total Copper	Total Nickel	Total Lead
At M-59 Marsh outlet	<400	<0.5	150	<0.5	23	0.2	2.8	48	<4	2.5
Mid Marsh East of building	<400	<0.4	120	<0.5	22	<0.2	6.5	200	<4	<2.0
Roof and parking lot runoff	964	1.3	914	<0.5	70	0.6	24	560	<4	<2.0
Outlet from Waterbury Lake	-	3.6	-	<0.5	-	<0.2	<2	3	<4	<2.0
Middle of Marsh (1978)	2000	-	-	-	2200	-	10	440	<50	<50

able 2. Concentrations of selected heavy metals in sediments in the vicinity of Hi-Hill Manufacturing Company, April 26, 1984. Results in mg/kg dry weight.

Location Sampled	Total Aluminum	Total Arsenic	Total Iron	Total Mercury	Total Zinc	Total Cadmium	Total Chromium	Total Copper	Total Nickel	Total Lead	Total Manganese	Total % Solids	Total Lithium
At M-59 Marsh outlet	29,200	7.5	19,900	<0.5	1,800	11.0	2,350	10,000	50	269	360	13	-
Mid Marsh East of building	16,100	4.2	15,600	<0.5	1,500	8.5	5,300	5,650	19	84	130	24	90
Parking lot and roof runoff	11,890	5.8	17,700	0.7	1,700	11.0	2,240	4,700	18	97	380	32	90
Outlet from Waterbury Lake	7,190	5.5	10,100	<0.5	150	<2.0	50	155	13	91	150	14	15

Table 3. Aquatic plants found in the Marsh, east of Hi-Mill Manufacturing Company, Oakland County, Michigan, April 26, 1984.

Algae	Macrophytes
Spirogyra	Typha
Euglena	Scirpus
Scenedesmus	Lemna minor
Oocystis	Elodea
Oscillatoria	Potamogeton
Mougeotia	
Synedra	

MICHIGAN DEPARTMENT OF NATURAL RESOURCES
WATER QUALITY DIVISION

BIOLOGY SECTION
STREAM PROBLEM ASSESSMENT

Station Number 1 Investigator(s) Kenaga, Wuycheck

Date 4 / 26 / 84 TIME 11:30 am PHOTOGRAPH NUMBER

BODY OF WATER Marsh east end of Hi-Mill LOCATION near outlet under M-59, 15' fr. north shore

COUNTY Oakland T 3N R 7E S 23 TWP Highland

REASON FOR SURVEY Hi-Mill Mfg.

VICINITY LAND USE: Mostly Forest Mostly Urban Mostly Agriculture Other

AVE. STREAM WIDTH marsh m AVE. STREAM DEPTH 2.5 ft. VELOCITY 0 ms STREAM km

STREAM SHADING: Open Partly Open Shaded STREAM TYPE: Coldwater Warmwater

WATER TEMP. 74 °F AIR TEMP. 65 °F WEATHER: Sunny — Partly Cloudy — Cloudy — Rainy DAM u/s: Yes No km

CHANNELIZED: Yes No CHANNEL EROSION: None — Slight — Moderate — Severe HIGH WATER MARK 6 in.

SECCHI DISC TRANS: 3 ft TURBIDITY: Clear — Slightly Turbid — Turbid — Opaque WATER COLOR light brown

WATER ODORS: Normal Sewage Petroleum Chemical Other

SURFACE OILS: None Slick Sheen Globs Flecks

SEDIMENT ODORS: Normal Sewage Petroleum Chemical Anaerobic Other

SEDIMENT OILS: Absent Slight Moderate Profuse

DEPOSITS: Sludge Sawdust Paperfiber Sand Relict Shells Other

ARE THE UNDERSIDES OF STONES WHICH ARE NOT DEEPLY IMBEDDED IN SUBSTRATE BLACK? YES NO

SUBSTRATE TYPE	FLOW VELOCITY m/sec	CHARACTERISTICS OR SIZE	PERCENT IN SAMPLING AREA
BOULDERS*	>1.2 (>3 fps)	256 mm (10") dia.	
RUBBLE*	>0.6 (>2 fps)	64-256 mm (2.1-10") dia.	
GRAVEL*	>0.3 (>1 fps)	2-64 mm (0.1-2.5") dia.	
SAND	>0.2 (>0.7 fps)	0.06-2.00 mm dia. Gritty texture	
SILT	>0.12 (>0.4 fps)	0.004-0.006 mm dia.	
MUCK-MUD	>0.12 (>0.4 fps)	black, very find organic	20

*IMBEDDEDNESS: 0 = NONE 1 = 1/3 OR LESS 2 = 2/3 OR MORE

SUBSTRATE TYPE	CHARACTERISTICS OR SIZE	PERCENT IN SAMPLING AREA
CLAY	Slick texture	
MARL	Grey, shell fragments	
DETRITUS	Sticks, wood, coarse plant materials	7
FIBROUS PEAT	Partially decomposed plant material	
PULPY PEAT	Finely divided plant material, parts indistinguishable	10
LOGS & STICKS		

BIOTA:

PHYTOPLANKTON	0	1	2	3	4	SLIMES	(0)	1	2	3	4
PERIPHYTON	0	1	(2)	3	4	ZOOPLANKTON	0	1	2	(3)	4
FILAMENTOUS ALGAE	0	1	(2)	3	4	MACROINVERTEBRATES	0	1	(2)	3	4
MACROPHYTES	0	1	(2)	3	4	FISH	0	1	2	3	4

none seen

0 - Absent 1 - Sparse 2 - Moderate 3 - Abundant 4 - Profuse

FISH GAME FISH

ROUGH FISH

FORAGE FISH

AQUATIC PLANTS — PERIPHYTON — FILAMENTOUS ALGAE

MACROPHYTES: Typha, Scirpus, Lemna minor; Elodea, Potamogeton

periphyton or algae coats everything in this area

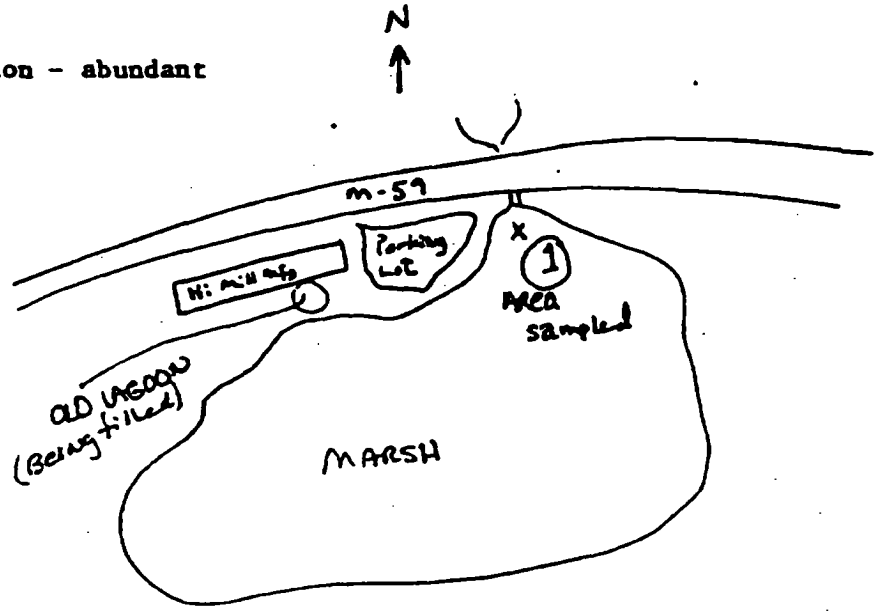
STREAMBANK VEGETATION: GRASSES, BRUSH, HERBACEOUS, CONIFERS, DECIDUOUS, BARREN, OTHER_____

MACROBENTHOS QUALITATIVE SAMPLE CHECK LIST (INDICATE DOMINANT GROUPS)

SPONGES	DRAGONFLIES	RATTAILED MAGGOTS
HYDRA	DAMSELFLIES	MIDGES C-A
FLATWORMS	TRUE BUGS	STONEFLIES
ROUNDWORMS	BEETLES	MAYFLIES
LEECHES	AQUATIC CATTERPILLARS	-BURROWERS
WATER MITES	ALDERFLIES	-SWIMMERS
SOWBUGS	HELLGRAMITES	-CLINGERS, SPRAWLERS
SCUDS	CRANEFLIES	CADDISFLIES
CRAYFISH	NO-SEE-UMS	-FREE LIVING
SNAILS-LIMPETS	BLACKFLIES	-PURSE CASE MAKERS
CLAMS	DEERFLIES	-TUBE CASE MAKERS
AQUATIC EARTHWORMS	MOSQUITOES	-SADDLECASE MAKERS
	SNIPEFLIES	-NET SPINNERS OR RETREATMAKERS

NOTES, ETC.

Zooplankton - abundant



MICHIGAN DEPARTMENT OF NATURAL RESOURCES
WATER QUALITY DIVISION

BIOLOGY SECTION
STREAM PROBLEM ASSESSMENT

Station Number 2 Investigator(s) Kenaga, Wuycheck

Date 4 / 26 / 84 TIME 12:30 PHOTOGRAPH NUMBER

BODY OF WATER marsh SE of Hi-Mill Mfg. LOCATION SE of Hi-Mill near outlet from old lagoons

COUNTY Oakland T3N R7E S Highland TWP

REASON FOR SURVEY Hi-Mill Mfg.

VICINITY LAND USE: Mostly Forest Mostly Urban Mostly Agriculture Other

AVE. STREAM WIDTH marsh m AVE. STREAM DEPTH 2.5 ft VELOCITY 0 ms STREAM km

STREAM SHADING: Open Partly Open Shaded STREAM TYPE: Coldwater Warmwater

WATER TEMP. 74 °F AIR TEMP. 65 °F WEATHER: Sunny – Partly Cloudy – Cloudy – Rainy DAM u/s: Yes No km

CHANNELIZED: Yes No CHANNEL EROSION: None — Slight — Moderate — Severe HIGH WATER MARK 6 in.

SECCHI DISC TRANS: 3 ft. TURBIDITY: Clear — Slightly Turbid — Turbid — Opaque WATER COLOR

WATER ODORS: Normal Sewage Petroleum Chemical Other

SURFACE OILS: None Slick Sheen Globs Flecks

SEDIMENT ODORS: Normal Sewage Petroleum Chemical Anaerobic Other

SEDIMENT OILS: Absent Slight Moderate Profuse

DEPOSITS: Sludge Sawdust Paperfiber Sand Relict Shells Other

ARE THE UNDERSIDES OF STONES WHICH ARE NOT DEEPLY IMBEDDED IN SUBSTRATE BLACK? YES NO

SUBSTRATE TYPE	FLOW VELOCITY m/sec	CHARACTERISTICS OR SIZE	PERCENT IN SAMPLING AREA
BOULDERS*	>1.2 (>3 fps)	256 mm (10") dia.	
RUBBLE*	>0.6 (>2 fps)	64-256 mm (2.1-10") dia.	
GRAVEL*	>0.3 (>1 fps)	2-64 mm (0.1-2.5") dia.	
SAND	>0.2 (>0.7 fps)	0.06-2.00 mm dia. Gritty texture	
SILT	>0.12 (>0.4 fps)	0.004-0.006 mm dia.	
MUCK-MUD	>0.12 (>0.4 fps)	black, very find organic	20

*IMBEDDEDNESS: 0 = NONE 1 = 1/3 OR LESS 2 = 2/3 OR MORE

SUBSTRATE TYPE	CHARACTERISTICS OR SIZE	PERCENT IN SAMPLING AREA
CLAY	Slick texture	
MARL	Grey, shell fragments	
DETRITUS	Sticks, wood, coarse plant materials	70
FIBROUS PEAT	Partially decomposed plant material	
PULPY PEAT	Finely divided plant material, parts indistinguishable	10
LOGS & STICKS		

BIOTA:

PHYTOPLANKTON	0	1	2	3	4	SLIMES	(0)	1	2	3	4
PERIPHYTON	0	1	(2)	3	4	ZOOPLANKTON	0	1	2	(3)	4
FILAMENTOUS ALGAE	0	1	(2)	3	4	MACROINVERTEBRATES	0	1	(2)	3	4
MACROPHYTES	0	1	(2)	3	4	FISH	0	1	2	3	4

none seen

0 - Absent 1 - Sparse 2 - Moderate 3 - Abundant 4 - Profuse

FISH GAME FISH

ROUGH FISH

FORAGE FISH

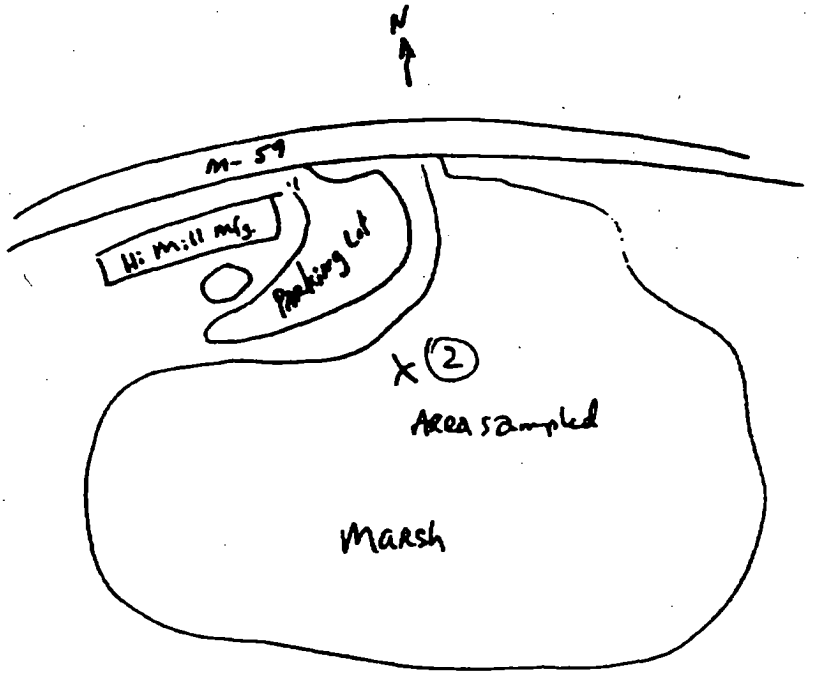
AQUATIC PLANTS		PERIPHYTON	FILAMENTOUS ALGAE
MACROPHYTES	Typha, Scirpus, Lemna minor, Elodea, Potamogeton		Periphyton and/or filamentous algae covered everything in this area.

STREAMBANK VEGETATION: GRASSES BRUSH HERBACEOUS CONIFERS DECIDUOUS BARREN OTHER_____

MACROBENTHOS QUALITATIVE SAMPLE CHECK LIST (INDICATE DOMINANT GROUPS)

SPONGES	DRAGONFLIES	RATTAILED MAGGOTS
HYDRA	DAMSELFLIES	MIDGES C-A
FLATWORMS	TRUE BUGS	STONEFLIES
ROUNDWORMS	BEETLES	MAYFLIES
LEECHES	AQUATIC CATTERPILLARS	-BURROWERS
WATER MITES	ALDERFLIES	-SWIMMERS
SOWBUGS	HELLGRAMITES	-CLINGERS, SPRAWLERS
SCUDS	CRANEFLIES	CADDISFLIES
CRAYFISH	NO-SEE-UMS	-FREE LIVING
SNAILS-LIMPETS	BLACKFLIES	-PURSE CASE MAKERS
CLAMS	DEERFLIES	-TUBE CASE MAKERS
AQUATIC EARTHWORMS	MOSQUITOES	-SADDLECASE MAKERS
	SNIPEFLIES	-NET SPINNERS OR RETREATMAKERS

NOTES, ETC. Zooplankton - Abundant in water column



MICHIGAN DEPARTMENT OF NATURAL RESOURCES
WATER QUALITY DIVISION

BIOLOGY SECTION
STREAM PROBLEM ASSESSMENT

Station Number 3 Investigator(s) Kenaga, Wuycheck

Date 4 / 26 / 84 TIME 1:00 PHOTOGRAPH NUMBER

BODY OF WATER Roof and Parking lot off to marsh SE of LOCATION Hi-Mill Mfg. pipe at east edge of parking lot

COUNTY Oakland T 3N R 7E S 23 TWP Highland

REASON FOR SURVEY Hi-Mill Mfg. Co.

VICINITY LAND USE: Mostly Forest Mostly Urban Mostly Agriculture Other

AVE. STREAM WIDTH 6 in AVE. STREAM DEPTH 1 in. VELOCITY <0.4 fps STREAM km

STREAM SHADING: Open Partly Open Shaded STREAM TYPE: Coldwater Warmwater

WATER TEMP. – °C AIR TEMP. 65 °F WEATHER: Sunny – Partly Cloudy – Cloudy – Rainy DAM u/s: Yes No km

CHANNELIZED: Yes No CHANNEL EROSION: None — Slight — Moderate — Severe HIGH WATER MARK 6 in.

SECCHI DISC TRANS: – m TURBIDITY: Clear — Slightly Turbid — Turbid — Opaque WATER COLOR

WATER ODORS: Normal Sewage Petroleum Chemical Other

SURFACE OILS: None Slick Sheen Globs Flecks

SEDIMENT ODORS: Normal Sewage Petroleum Chemical Anaerobic Other

SEDIMENT OILS: Absent Slight Moderate Profuse

DEPOSITS: Sludge Sawdust Paperfiber Sand Relict Shells Other

ARE THE UNDERSIDES OF STONES WHICH ARE NOT DEEPLY IMBEDDED IN SUBSTRATE BLACK? YES NO

SUBSTRATE TYPE	FLOW VELOCITY m/sec	CHARACTERISTICS OR SIZE	PERCENT IN SAMPLING AREA
BOULDERS*	>1.2 (>3 fps)	256 mm (10") dia.	
RUBBLE*	>0.6 (>2 fps)	64-256 mm (2.1-10") dia.	
GRAVEL*	>0.3 (>1 fps)	2-64 mm (0.1-2.5") dia.	
SAND	>0.2 (>0.7 fps)	0.06-2.00 mm dia. Gritty texture	
SILT	>0.12 (>0.4 fps)	0.004-0.006 mm dia.	
MUCK-MUD	>0.12 (>0.4 fps)	black, very find organic	10

*IMBEDDEDNESS: 0 = NONE 1 = 1/3 OR LESS 2 = 2/3 OR MORE

SUBSTRATE TYPE	CHARACTERISTICS OR SIZE	PERCENT IN SAMPLING AREA
CLAY	Slick texture	
MARL	Grey, shell fragments	
DETRITUS	Sticks, wood, coarse plant materials	70
FIBROUS PEAT	Partially decomposed plant material	
PULPY PEAT	Finely divided plant material, parts indistinguishable	10
LOGS & STICKS		

BIOTA:

PHYTOPLANKTON	~~0~~	1	2	3	4	SLIMES	(0)	1	2	3	4
PERIPHYTON	0	1	(2)	3	4	ZOOPLANKTON	(0)	1	2	3	4
FILAMENTOUS ALGAE	0	1	(2)	3	4	MACROINVERTEBRATES	(0)	1	2	3	4
MACROPHYTES	(0)	1	2	3	4	FISH	(0)	1	2	3	4

0 - Absent 1 - Sparse 2 - Moderate 3 - Abundant 4 - Profuse

FISH GAME FISH

ROUGH FISH

FORAGE FISH - one dead mud minnow near parking lot runoff site

AQUATIC PLANTS PERIPHYTON FILAMENTOUS ALGAE

MACROPHYTES

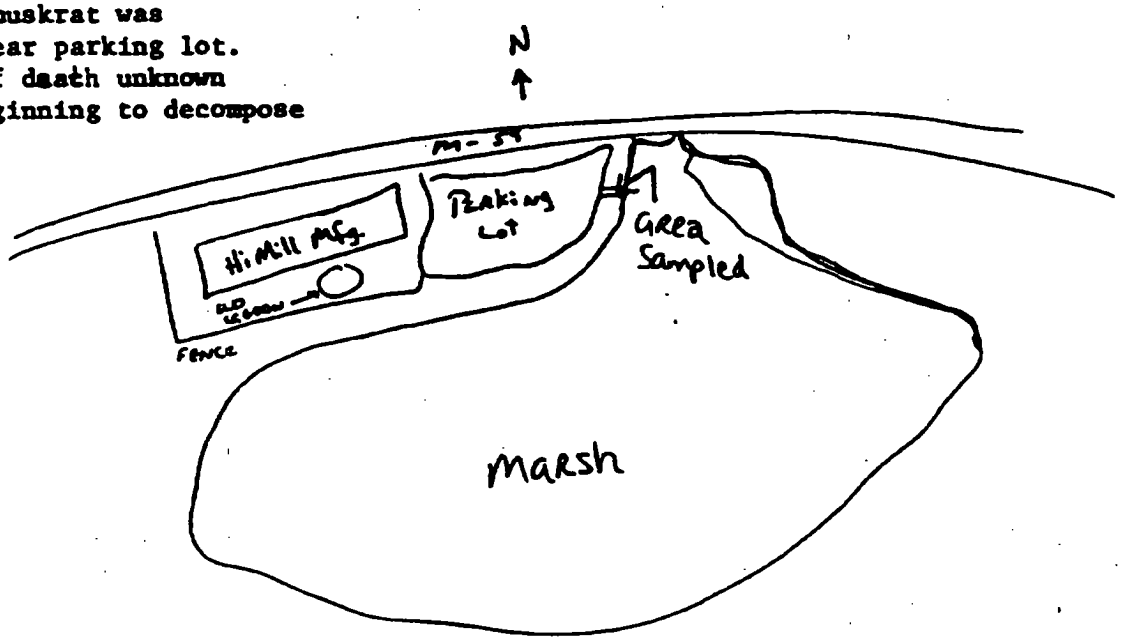
STREAMBANK VEGETATION: GRASSES BRUSH HERBACEOUS CONIFERS DECIDUOUS BARREN OTHER_____

MACROBENTHOS QUALITATIVE SAMPLE CHECK LIST (INDICATE DOMINANT GROUPS)

SPONGES	DRAGONFLIES	RATTAILED MAGGOTS
HYDRA	DAMSELFLIES	MIDGES
FLATWORMS	TRUE BUGS	STONEFLIES
ROUNDWORMS	BEETLES	MAYFLIES
LEECHES	AQUATIC CATTERPILLARS	-BURROWERS
WATER MITES	ALDERFLIES	-SWIMMERS
SOWBUGS	HELLGRAMITES	-CLINGERS, SPRAWLERS
SCUDS	CRANEFLIES	CADDISFLIES
CRAYFISH	NO-SEE-UMS	-FREE LIVING
SNAILS-LIMPETS	BLACKFLIES	-PURSE CASE MAKERS
CLAMS	DEERFLIES	-TUBE CASE MAKERS
AQUATIC EARTHWORMS	MOSQUITOES	-SADDLECASE MAKERS
	SNIPEFLIES	-NET SPINNERS OR RETREATMAKERS

NOTES, ETC. No macroinvertebrates in small trickel

A dead muskrat was noted near parking lot. Cause of death unknown body beginning to decompose



FISH — GAME FISH

ROUGH FISH

FORAGE FISH - minnows noted in shallow areas

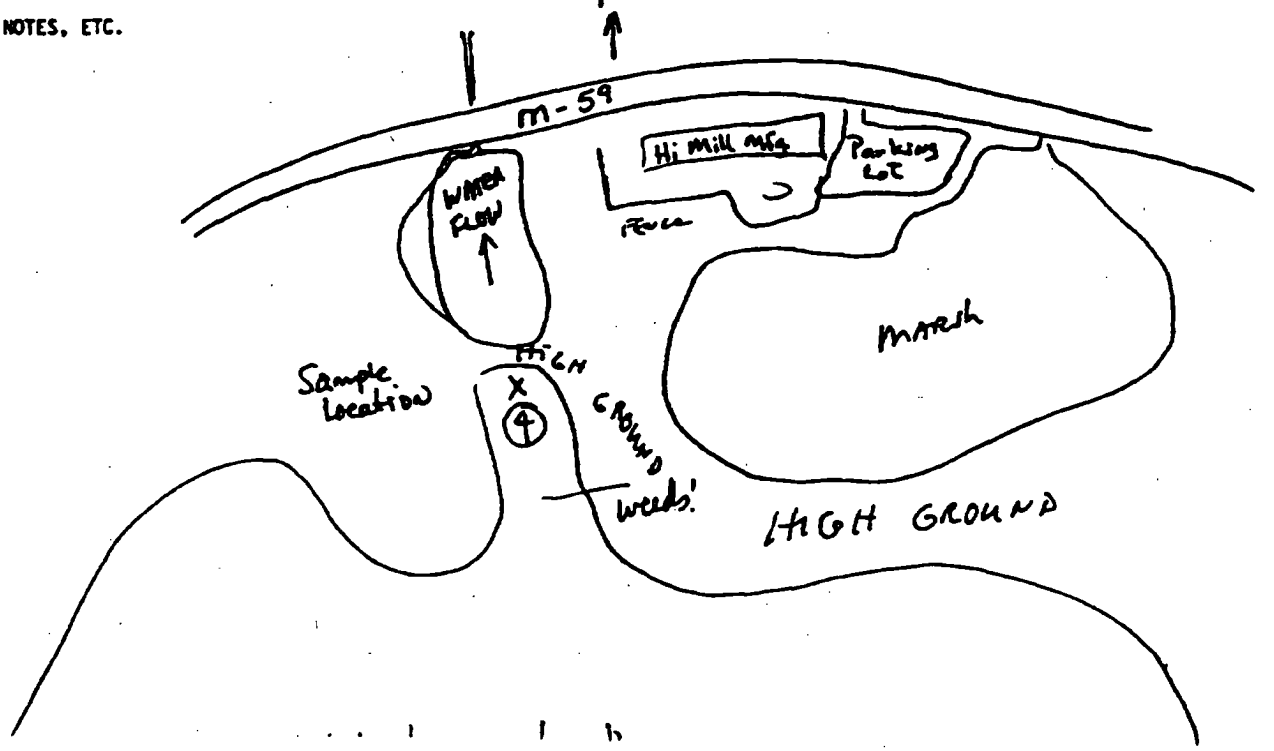
AQUATIC PLANTS			PERIPHYTON	FILAMENTOUS ALGAE
MACROPHYTES	Scirpus	Potamogeton		
	Typha	Nuphar		
	Chaga	Nymphea		

STREAMBANK VEGETATION: GRASSES BRUSH HERBACEOUS CONIFERS DECIDUOUS BARREN OTHER _____

MACROBENTHOS QUALITATIVE SAMPLE CHECK LIST (INDICATE DOMINANT GROUPS)

SPONGES	DRAGONFLIES	RATTAILED MAGGOTS
HYDRA	DAMSELFLIES	MIDGES
FLATWORMS	TRUE BUGS	STONEFLIES
ROUNDWORMS	BEETLES	MAYFLIES
LEECHES	AQUATIC CATTERPILLARS	-BURROWERS
WATER MITES	ALDERFLIES	-SWIMMERS
SOWBUGS	HELLGRAMITES	-CLINGERS, SPRAWLERS
SCUDS	CRANEFLIES	CADDISFLIES
CRAYFISH	NO-SEE-UMS	-FREE LIVING
SNAILS-LIMPETS	BLACKFLIES	-PURSE CASE MAKERS
CLAMS	DEERFLIES	-TUBE CASE MAKERS
AQUATIC EARTHWORMS	MOSQUITOES	-SADDLECASE MAKERS
	SNIPEFLIES	-NET SPINNERS OR RETREATMAKERS

NOTES, ETC.



MICHIGAN DEPARTMENT OF NATURAL RESOURCES
WATER QUALITY DIVISION

BIOLOGY SECTION
STREAM PROBLEM ASSESSMENT

Station Number 4 Investigator(s) Kenaga, Wuycheck

Date 4 / 26 / 84 TIME 2:00 PHOTOGRAPH NUMBER

BODY OF WATER Waterburg Lake LOCATION at outlet

COUNTY Oakland T3N R7E S 23 TWP HIGHLAND

REASON FOR SURVEY Hi-Mill Mfg. Co.

VICINITY LAND USE: Mostly Forest Mostly Urban Mostly Agriculture Other Park

AVE. STREAM WIDTH Lake m AVE. STREAM DEPTH 5 ft. VELOCITY - ms STREAM km

STREAM SHADING: Open Partly Open Shaded STREAM TYPE: Coldwater Warmwater

WATER TEMP. - °C AIR TEMP. 65°F WEATHER: Sunny – Partly Cloudy – Cloudy – Rainy DAM u/s: Yes No km

CHANNELIZED: Yes No CHANNEL EROSION: None — Slight — Moderate — Severe HIGH WATER MARK 2 m

SECCHI DISC TRANS: 5 ft. TURBIDITY: Clear — Slightly Turbid — Turbid — Opaque WATER COLOR clear

WATER ODORS: Normal Sewage Petroleum Chemical Other

SURFACE OILS: None Slick Sheen Globs Flecks

SEDIMENT ODORS: Normal Sewage Petroleum Chemical Anaerobic Other

SEDIMENT OILS: Absent Slight Moderate Profuse

DEPOSITS: Sludge Sawdust Paperfiber Sand Relict Shells Other

ARE THE UNDERSIDES OF STONES WHICH ARE NOT DEEPLY IMBEDDED IN SUBSTRATE BLACK? YES NO

SUBSTRATE TYPE	FLOW VELOCITY m/sec	CHARACTERISTICS OR SIZE	PERCENT IN SAMPLING AREA
BOULDERS*	>1.2 (>3 fps)	256 mm (10") dia.	
RUBBLE*	>0.6 (>2 fps)	64-256 mm (2.1-10") dia.	
GRAVEL*	>0.3 (>1 fps)	2-64 mm (0.1-2.5") dia.	
SAND	>0.2 (>0.7 fps)	0.06-2.00 mm dia. Gritty texture	
SILT	>0.12 (>0.4 fps)	0.004-0.006 mm dia.	
MUCK-MUD	>0.12 (>0.4 fps)	black, very find organic	20

*IMBEDDEDNESS: 0 = NONE 1 = 1/3 OR LESS 2 = 2/3 OR MORE

SUBSTRATE TYPE	CHARACTERISTICS OR SIZE	PERCENT IN SAMPLING AREA
CLAY	Slick texture	
MARL	Grey, shell fragments	
DETRITUS	Sticks, wood, coarse plant materials	60
FIBROUS PEAT	Partially decomposed plant material	
PULPY PEAT	Finely divided plant material, parts indistinguishable	20
LOGS & STICKS		

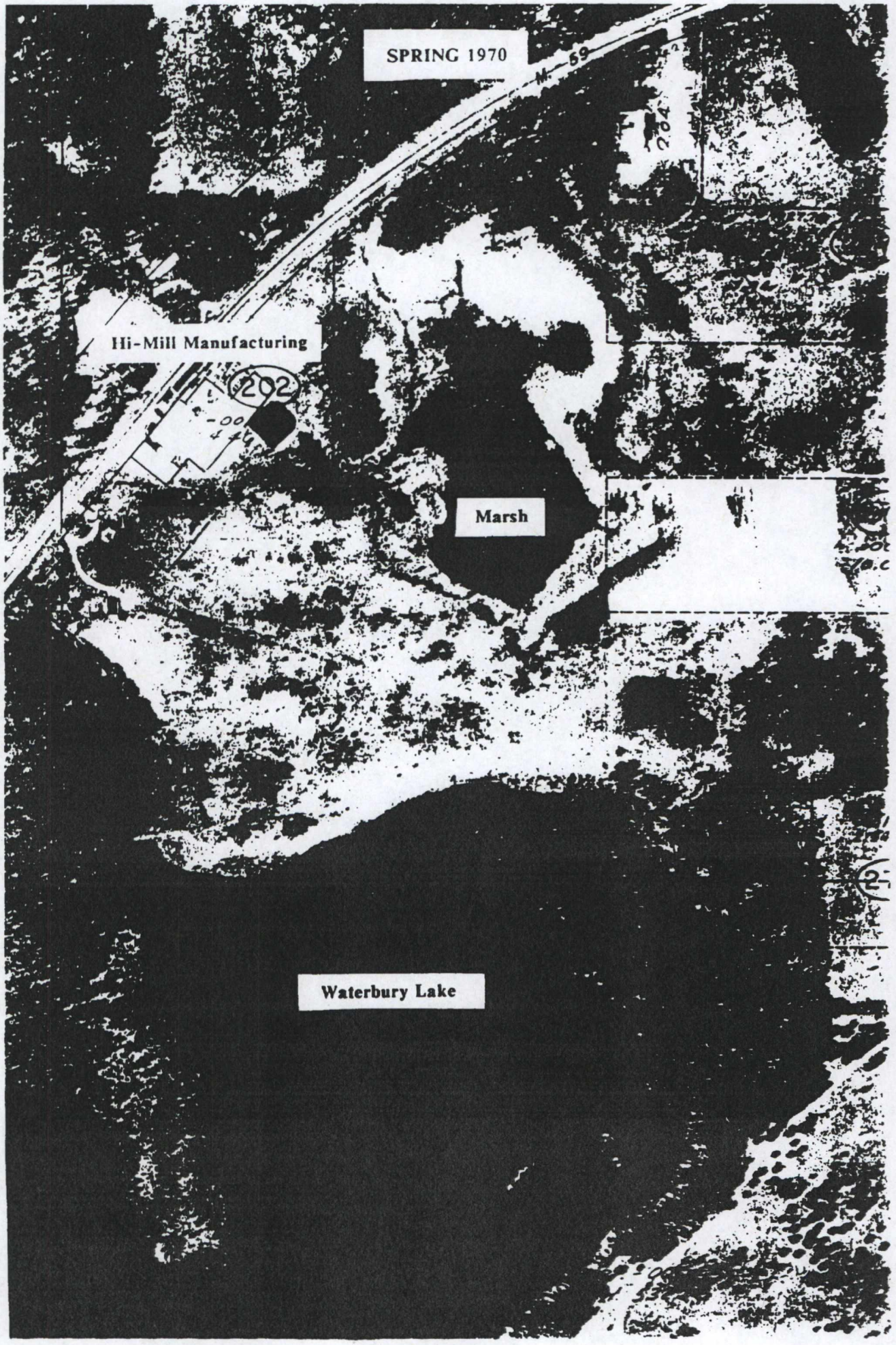
BIOTA:

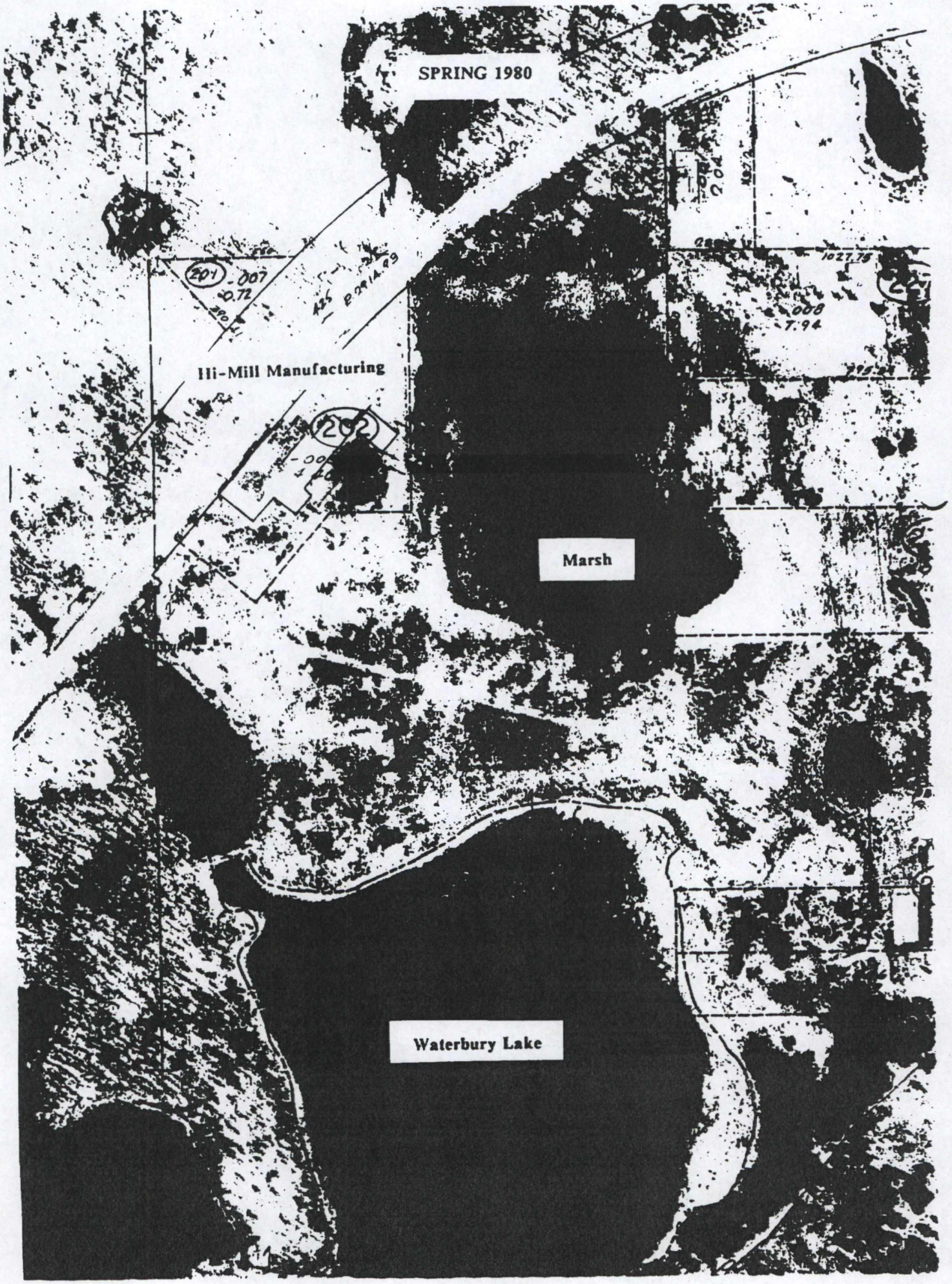
PHYTOPLANKTON	~~0~~	1	2	3	4	SLIMES	(0)	1	2	3	4
PERIPHYTON	0	(1)	2	3	4	ZOOPLANKTON	0	(1)	2	3	4
FILAMENTOUS ALGAE	0	(1)	2	3	4	MACROINVERTEBRATES	0	1	2	3	4
MACROPHYTES	0	1	2	(3)	4	FISH	0	1	(2)	3	4

0 - Absent 1 - Sparse 2 - Moderate 3 - Abundant 4 - Profuse

APPENDIX I

AERIAL PHOTOGRAPHS


SPRING 1970
M-59
Hi-Mill Manufacturing
202
Marsh
Waterbury Lake


SPRING 1980
Hi-Mill Manufacturing
Marsh
Waterbury Lake

APPENDIX J

1983 MDNR LETTER - LAGOON CLOSURE
(REF. 7)

STATE OF MICHIGAN

NATURAL RESOURCES COMMISSION
JACOB A. HOEPER
E. M. LAITALA
HILARY F. SNELL
PAUL H. WENDLER
HARRY H. WHITELEY

James J. Blanchard, Governor

DEPARTMENT OF NATURAL RESOURCES
STEVENS T. MASON BUILDING
BOX 30028
LANSING, MI 48909
HOWARD A. TANNER, Director

Groundwater Quality Division
Detroit District Office
1120 S. State Fair Ave.
Detroit, MI 48203
(313) 368-3335

September 8, 1983

Bob Beard
HiMill Manufacturing Co.
1704 Highland Road
Highland, MI 48031

SUBJECT: Filling in Lagoon and DNR Hydrogeological Study File #630375

Dear Mr. Beard:

I would like to take this opportunity to summarize our conversations of the past few weeks, including 9/6/83. You have requested permission to fill in your lagoon, with inert material, which has not been used for approximately 3 years and is currently at its driest level. As per our discussion you stated you have been seeking a licensed company to analyze the lagoon sludge, remove and properly dispose of it. I recommend in so doing that all the sludge and soil be removed to the underlying clay layer. I requested that our office receive a copy of the sludge analysis along with the determination as to whether it is classified hazardous or non-hazardous in accordance with Act 64 and RCRA definition. I also requested that our office be made aware of the intended disposal site. My supervisor has requested that a member of our staff be allowed to inspect the lagoon after sludge/contaminated soil removal, prior to filling.

What our office proposes is some further study into the extent of any groundwater contamination. As discussed samples will be taken, Tuesday, September 13, 1983, of the groundwater at points noted in the hydrogeological study. This will give us a more recent "look" at the situation. Subsequent samples will then be required after the sludge removal. These will be compared to the original to assure that contamination removal was complete.

At any time after our inspection of the sludge removal, you are free to fill in the lagoon. However, I must advise you that if further studies show that additional contamination exists the department may require you to re-excavate it. We sincerely hope that removal of the sludge and contaminated soil will resolve any groundwater contamination problem.

Enclosed is a copy of the hydrogeological study done by the DNR Water Quality Division compiled August 31, 1982. If you have any questions, please do not hesitate to call.

Sincerely,
GROUNDWATER QUALITY DIVISION

Lynne King
DETROIT DISTRICT OFFICE

LK:pf
cc: Dave Dennis H. Shakir Frank Belobraidich

R1026 1/80

APPENDIX K

SITE DESCRIPTION/EXECUTIVE SUMMARY - 1984 (REF. 8)

SITE DESCRIPTION/EXECUTIVE SUMMARY

Site Name:
Hi Mill Manufacturing
Street Number & Name:
1074 Highland Road
City:
Highland

State: Michigan
Zip Code: 48031

County: Oakland
Michigan Code Number: 63-03N-07E-23AB
DNR District: Detroit
EPA ID Number:

SAS Score/Screen No.: 178

From 1946, when operations began, to approximately 1981 the company discharged process water to an unlined holding pond. When this practice ceased they began disposing of the water (containing metals) by spray evaporation around the pond area. This practice ceased in November 1983, and disposal now is handled by a licensed waste hauler.

At various times the pond overflowed into a marsh east of the site. Although the marsh is near a large lake, there is no surface water connection between the two. However, groundwater contamination is known, and samples of lake waters have contained metals. Contamination of the water and sediments in the marsh is also known.

Sludges and sediments in the pond have been removed down to clay, and the hole filled in which "clean " fill. This operation has been supervised by the DNR, Hazardous Waste Division (Lynn King).

The company fabricates tubular aluminum and copper parts. It is located in the Highland Recreation area, about 1.5 miles east of Highland (population less than 1000), 1980 census).

Date of Previous Summary: 8/13/84
Previous Author:

Current Date: 10/11/84
Author: Lonnie Lee

Site Assessment Unit
Groundwater Quality Division
Michigan Dept. of Natural Resources

APPENDIX L

TECHNA CORPORATION
RESUMES

JAMES M. HARLESS, Ph.D.

EDUCATION

Ph.D., Organic Chemistry, The University of Texas, 1975
B.A., Chemistry, Rice University, 1970

EXPERIENCE

* Summary

President, Techna Corporation	1986 - Date
Principal, Quantum Consultants	1985 - 1986
President, Environmental Research Group, Inc.	1984 - 1985
Program Manger, Radian Corporation	1982 - 1984
Department Head, Radian Corporation	1981 - 1982
Group Leader, Radian Corporation	1979 - 1981
Staff Scientist, Radian Corporation	1976 - 1979
Laboratory Design Consultant (part time)	1980 - 1983

* Techna Corporation, Ann Arbor, Michigan

President and senior technical manager of a company providing research and regulatory compliance services in all areas of environmental, hazardous waste, and hazardous chemicals activities. Projects have included oil spill decontamination and remediation, development of hazardous waste management programs, waste characterization and disposal, hazard communication programs, site contamination assessment and remedial action planning, industrial effluent analysis and management programs, and environmental audits. A large environmental chemistry laboratory was designed for the U.S. Army Corps of Engineers.

* Quantum Consultants, Ann Arbor, Michigan

Principal and senior project/technical manager providing technical services in the areas of hazardous waste management, hazardous chemicals management and environmental regulations compliance. Projects included environmental and safety audits, waste management programs, groundwater and effluent sampling and analysis, assessments of chemically contaminated plant sites, development of hazard communication compliance and training programs, and design of a pharmaceutical manufacturing facility.

* Environmental Research Group, Inc., Ann Arbor, Michigan

Activities as President and Chief Operating Officer included corporate and senior technical management for a technical consulting company (environmental, industrial hygiene, hazardous waste, and chemical analysis services) comprised of 120 staff members in five nationwide locations. Technical activities included project design and management in the areas of hazardous waste management, analytical chemistry, waste site investigation, water pollution control, and chemical health and safety. Projects included assessments of chemically contaminated sites, development of efficient chemical analysis programs for groundwater and

effluent monitoring projects, air and wastewater permit support, wastewater treatment system evaluations, development of hazardous waste management and delisitng programs, and industrial hygiene surveys.

* Radian Corporation, Austin, Texas

Management and technical responsibilities included new business development, marketing, and design and management of projects ranging in size from $10,000 to $5 million. Business/technical areas of responsibility included hazardous waste programs, hazardous materials management and safety, analytical chemistry, data management, specialty chemical products, and pharmaceutical chemistry. Activities included design of quality assurance analytical standards programs for environmental analysis, development of chemical sampling and analysis procedures for environmental assessment of major industries, and development of hazardous materials handling facilities and safety programs. Other activities included hazardous waste site investigations, industrial hygiene surveys, chemical synthesis program development, and chemical analysis methods validations.

* Laboratory Design Consultant, Austin, Texas

The laboratory services and facilities of a major drinking water treatment facility were evaluated, a five-year expansion plan was developed, and a new 35,000 square foot laboratory and office complex was designed.

SPECIAL ACTIVITIES

Task Force for Scientific and Technical Assessments of Hazardous Waste Management, U.S. Intergovernmental Science, Engineering and Technology Advisory Panel, Washington, D.C., 1979.

Resource, Conservation and Recovery Act (RCRA) Task Force, American Chemical Society-Joint Committees, Washington, D.C., 1982 - present.

Small Quantity Generator Education Advisory Panel, Waste Systems Institute of Michigan, Inc./Michigan Department of Natural Resources, Lansing, Michigan, 1986 - present.

Symposium Organizer and Chair, American Chemical Society Annual Meetings:

- "Safety Concerns at Hazardous Waste Sites", Kansas City, Missouri, September, 1982.

- "Hazardous Materials Safety in the Chemistry Laboratory", St. Louis, Missouri, April, 1984.

Exposition Planning and Coordinating Committee, "Laboratory of the Future," Scientific Apparatus Manufacturers Association, 1983 - 1984.

Community Forum on Managing Small Quantities of Hazardous Waste, Washtenaw County, Michigan, 1986 - Present.

AFFILIATIONS

American Chemical Society, American Association for the Advancement of Science, American Society for Testing and Materials.

JAMES M. HARLESS, Ph.D.

PUBLICATIONS

Cantrell, T.S., J.M. Harless and B.L. Strasser, "The Acetylation of Cyclononene," J. Org. Chem., 36, 1191 (1971).

Harless, J.M. and S.A. Monti, "Tricyclo[3.1.1.$0^{3,6}$]heptan-6- carboxylic Acid," J. Amer. Chem. Soc., 94, 4714 (1974).

Monti, S.A. and J.M. Harless, "Synthesis of Tricyclo- [3.1.1.$0^{3,6}$]heptan-6-yl Derivatives," J. Amer. Chem. Soc., 99, 2690 (1977).

Harless, J.M., K.E. Baxter, L.H. Keith and D.B. Walters, "Design and Operation of a Hazardous Materials Laboratory," in Safe Handling of Chemical Carcinogens, Mutagens and Teratogens, D.B. Walters, ed. (Ann Arbor Press, Ann Arbor, MI) 1981.

Keith, L.H., D.B. Walters and J.M. Harless, "Analysis and Storage of Hazardous Environmental Chemicals for Toxicological Testing," in The Chemistry of Environmental Agents as Potential Health Hazards, J.M. McKinney, ed. (Ann Arbor Press, Ann Arbor, MI) 1981.

Walters, D.B., L.H. Keith, J.M. Harless and J.T. Ward, "Chemical Selection and Handling Aspects of Large-Scale Toxicological Testing: An Overview," in The Chemistry of Environmental Agents as Potential Health Hazards, J.M. McKinney, ed. (Ann Arbor Press, Ann Arbor, MI) 1981.

Harless, J.M., et al., RCRA and Laboratories, (American Chemical Society Press, Washington, D.C.) 1983.

Harless, J.M., "Chemical Waste Management in Academic Laboratories," The pHilter, 16, 1 (1983).

Harless, J.M., "Components in the Design of a Hazardous Chemicals Handling Facility," in Health and Safety for Toxicity Testing, D.B. Walters and C.W. Jameson, eds. (Butterworth Publishers, Boston) 1984.

Walters, D.B., J.M. Harless and R.S. Strickoff, "Chemical Containment: Criteria for Toxicity Testing Facilities," in Health and Safety for Toxicity Testing, D.B. Walters and C.W. Jameson, eds. (Butterworth Publishers, Boston) 1984.

Harless, J.M., "Environmental Risk Assessment for Real Estate Transactions," Michigan Real Property Review, 14, 81 (1987).

PAPERS PRESENTED

Harless, J.M., "Preliminary Results of Evaluations of the Level I Environmental Assessment Methods at a Coal Gasification Facility," Environmental Assessment Steering Committee, U.S. Environmental Protection Agency, Research Triangle Park, NC, March 13, 1978.

Harless, J.M., K.E. Baxter, L.H. Keith and D.B. Walters, "Design and Operation of a Hazardous Materials Laboratory," Division of Chemical Health and Safety, American Chemical Society Annual Meeting, Washington, D.C., September 9-14, 1979.

Harless, J.M., and R.L. Trammell, "Preparation of Quality Assurance Standards for Priority Pollutant Analyses, "Division of Environmental Chemistry, American Chemical Society Annual Meeting, New York, NY, August 24-27, 1981.

Harless, J.M., "Design of a Hazardous Materials Laboratory, Part II," Division of Chemical Health and Safety, American Chemical Society Annual Meeting, New York, NY, August 24-27, 1981.

Harless, J.M., and R.L. Trammell, "A Quality Assurance Program for Preparation of Priority Pollutant Analytical Standards," Division of Analytical Chemistry, American Chemical Society Annual Meeting, New York, NY, August 24-27, 1981.

Harless, J.M., "Design Considerations for a Toxic Chemicals Handling Facility," Division of Chemical Health and Safety, American Chemical Society Annual Meeting, Las Vegas, NV, March 28-31, 1982.

Harless, J.M., and A.W. Nichols, "Preparation of Quality Assurance Standards for Hazardous Waste Analyses, Part I," Division of Environmental Chemistry, American Chemical Society Annual Meeting, Las Vegas, NV, March 28-31, 1982.

Harless, J.M., and A.W. Nichols, "Preparation of Quality Assurance Standards for Hazardous Waste Analyses, Part II," Division of Environmental Chemistry, American Chemical Society Annual Meeting, Las Vegas, NV, March 28-31, 1982.

Harless, J.M., "A Laboratory Safety Program for Handling Hazardous Environmental Samples," Division of Chemical Health and Safety, American Chemical Society Annual Meeting, Kansas City, MO, September 13-17, 1982.

Harless, J.M., et. al., "Design and Operation of an Automated Glove Permeation Testing System," American Industrial Hygiene Association Annual Conference, Philadelphia, PA, May 12, 1983.

Harless, J.M., et. al., "Chemical Structure/Glove Permeation Relationships Developed from the NTP Glove Permeation Program," American Industrial Hygiene Association Annual Conference, Philadelphia, PA, May 12, 1983.

Harless, J.M., "Hazard and Risk Assessment for Handling Toxic Chemicals," Division of Chemical Health and Safety, American Chemical Society Annual Meeting, St. Louis, MO, April 8-13, 1984.

Harless, J.M., "Storage and Shipment of Hazardous Materials," Division of Chemical Health and Safety, American Chemical Society Annual Meeting, St. Louis, MO, April 8-13, 1984.

Harless, J.M., "A Detailed Regulatory Overview of RCRA," Michigan Industrial Hazardous Waste Conference, Detroit, MI, May 13-15, 1985.

APPENDIX M

TECHNA CORPORATION
REPRESENTATIVE PROJECTS

ASSESSMENT AND MANAGEMENT OF CHEMICALLY CONTAMINATED SITES

Groundwater Remedial Investigation/Feasibility Study

An extensive groundwater remedial investigation and feasibility study is underway at a large automotive manufacturing plant. Chlorinated solvents have been measured at environmentally significant levels in the groundwater under several areas of the plant. A major program has been implemented to determine the sources and migration patterns of the contamination. Activities include the installation and sampling of over twenty-five temporary and permanent monitoring wells in and around the plant buildings.

A feasibility study is also being implemented to determine the most cost effective method(s) to immediately limit the migration of contaminants and to ultimately remediate all zones of contamination.

Groundwater Assessment and Remedial Action Program

The groundwater beneath a large General Motors Corporation manufacturing plant was found to be contaminated with very high levels of chromium and sulfuric acid. Groundwater monitoring wells were installed to identify the source of the contamination and determine the leading edge of the contaminant plume.

A purge-well system was designed and installed to remove heavily contaminated groundwater and retard the migration of contaminants. The groundwater removed by the system is sent to an existing wastewater treatment plant for processing.

Site Assessment and Remedial Action

The plant site of a fiberglass products manufacturer was assessed for volatile solvents contamination after discovery of a major solvent spill and improper waste drum storage practices. An initial assessment defined the lateral spread of the spill and identified an area of suspected soils contamination near the drum storage area. The second phase of the project involved installation, sampling and analysis of groundwater monitoring wells and excavation of grossly contaminated soils.

Solvent contamination was discovered in the uppermost groundwater aquifer. However, preliminary risk assessments based upon data from the Centers for Disease Control, CERCLA, and MDNR risk assessment models indicate that the contaminant levels in the groundwater and remaining soils are below human effect thresholds. Discussions are being held with regulatory authorities concerning termination of remedial activities.

Site Assessment and Remedial Action

The plant site of a metal stripping and plating company was assessed for environmental contamination which might have resulted from improper raw material and hazardous waste storage practices. Over 170 drums of hazardous wastes were sampled, analyzed, transported from the site and properly disposed. Over 100 empty drums were also removed and disposed.

A comprehensive site sampling and analysis plan (organic and inorganic species) was developed and accepted by the Michigan Department of Natural Resources. Results showed elevated levels of chlorinated solvents and toxic metals in some surface soils at the site. A soils excavation and disposal program was implemented to remove all environmentally significant contaminants.

Oil Spill Remedial Action

An emergency remedial action program was developed and implemented in response to a spill of several hundred gallons of fuel oil into a construction excavation site at the University of Michigan. Approximately 7000 gallons of contaminated water and 70 cubic yards of contaminated soil were removed from a pit 20 feet deep. All materials were properly disposed.

Assessment of Contaminated Groundwater

After groundwater contamination was identified in a general site assessment program at a large automobile parts manufacturing plant, Techna was retained to determine the extent of contamination and evaluate the complex hydrogeological conditions at the site. Nine groundwater monitoring wells were installed and sampled for chlorinated organic solvent species. Groundwater elevation determinations indicated the potential for discontinuous flow directions resulting from localized groundwater mounding phenomena. However, evaluation of the chemical analysis results from samples collected from the selectively-placed monitoring wells revealed 1) the source of the contamination and 2) that the contaminant plume is moving according to regional groundwater flow and is not significantly impacted by the mounding effects.

The contaminant plume was partially delineated, and was found to be moving off-site toward a residential area. Additional investigations are in progress to determine the full extent of the plume and to develop sufficient data to perform a remedial action feasibility study.

Site Assessment and Remedial Action

An initial hazardous waste audit of a metal products manufacturer revealed the presence of several underground storage tanks containing waste cutting oils contaminated with chlorinated solvents. A large natural depression on the site was found to contain over 70 cubic yards of oil-soaked absorbent materials. A remedial action program to excavate and dispose of the tanks, underlying soils, and contaminated absorbent materials was immediately developed and implemented. Subsequent soils sampling and analysis revealed additional contamination with chlorinated solvents.

A groundwater assessment program is currently being implemented. Monitoring wells are being installed at several depths in the underlying fractured sandstone stratum to facilitate determination of contaminant migration potential.

Site Investigation and Feasibility Study for Closure of Part A Permitted Hazardous Waste Storage Facility

An 8000 square-foot, unlined drum storage area at a large General Motors Corporation manufacturing plant is being assessed as part of the Part A closure plan designed by Techna Corporation. Chemical analyses of initial subsurface samples revealed low levels of contamination by volatile solvents and toxic metals. A thorough subsurface investigation consisting of 27 soil borings and three groundwater monitoring wells is being implemented to determine the extent of contamination, to support development of a risk assessment model, and to provide data for a remedial action feasibility study.

Site Remedial Investigation/Feasibility Study

The site of a major drum recycling facility, which was visibly contaminated with organic materials, was assessed for its potential environmental impact. An extensive three dimensional sampling and analysis program was implemented. The results indicated that the contamination consisted primarily of high molecular weight oils and pigments, the site was underlain by a clay stratum, and there was no evidence of migration to groundwater.

A risk assessment and remedial action feasibility study was performed. The study concluded that appropriate remediation consisted of removal and disposal of surface soils, leaving the clay stratum intact.

Site Assessment

The site of a metalworking products manufacturer was investigated for environmental contamination resulting from improper management of effluents and wastes. The area was surveyed for soils contamination and the presence of buried drums, and soil profile borings were conducted to a depth of 25 feet. Soils and groundwater were sampled and analyzed for organic and inorganic contaminants. Remedial action programs to remove soils contaminated with oils were designed and executed with approval of the Michigan Department of Natural Resources.

Site Assessment

A portion of the plant site of a metal fabricating and coating company was investigated for potential environmental contamination from improper drum storage practices. The assessment involved soil and groundwater sampling and analysis for solvent and heavy metal species. No contamination was found, and all regulatory compliance orders were vacated.

HAZARDOUS WASTE MANAGEMENT

Hazardous Waste Management Program Support Services - General Motors Corporation

Techna is managing a year-long blanket contract to provide hazardous waste and other environmental management services to a large General Motors production facility. Specific projects include an inventory and re-characterization of plant waste streams, development of a drum management plan, effluent sampling and analysis, hazardous waste training programs, quality assurance inspections of hazardous waste transporters and disposal sites, and preparation of a comprehensive environmental regulations compliance program and written manual. Techna is also managing the closure of the plant's Part A permitted waste storage facilities and is performing contamination assessment and remedial action activities throughout the plant.

Hazardous Waste Disposal and Management Program - Metal Finisher

Over one hundred drums of waste chromic acid solutions and other hazardous wastes were sampled, analyzed, transported and disposed for a metal finishing and plating company. A comprehensive waste management program was then developed and implemented. The plan included construction of a proper waste storage area, development of waste handling procedures, and preparation of a contingency plan.

Hazardous Chemicals Management and Disposal - The Edison Institute

Chemical management services are being provided to the Edison Institute during the restoration of Thomas Edison's Menlo Park Laboratory in Greenfield Village. Chemical handling, personal protection, container restoration, and chemical disposal programs have been developed and are being managed. Approximately 3000 containers of hazardous and radioactive materials were cleaned and restored.

The 600 containers of waste chemicals generated from the restoration program are being consolidated and labpacked for disposal. Types of wastes being managed include flammables, corrosives, EP toxics, reactives, and listed wastes.

Laboratory Waste Management Services - Ford Motor Company

Packaging, transportation, and disposal management services were provided to Ford Motor Company research laboratories for the removal of over 600 containers of chemicals and chemical products. The chemical inventory contained flammable, toxic, corrosive, and reactive materials. Containers were segregated according to disposal method and site, and they were then labpacked. Four different licensed hazardous waste disposal sites were used.

Development of Chemical Wastes and Process Effluent Management Programs - Plastics Molding Company

Wastes and effluent management programs were developed for a large plastics molding and coating company in Georgia. Sludges and wastewater from paint spray booths were sampled and analyzed for organic and inorganic species and hazardous waste characteristics. Proper waste accumulation, storage, transportation and disposal programs and effluent treatment systems were developed.

Hazardous Waste Management Training Program - PetroChem Processing, Inc.

Techna Corporation is providing the hazardous waste management, hazard communication, and emergency response training for employees of PetroChem Processing, Inc., a hazardous wastes-to-fuels processing facility. The training program was developed jointly by Techna and client personnel and is presented in half-day sessions.

Hazardous Waste Management and Contingency Planning - Tool and Die Company

A hazardous waste management plan and a written contingency plan were developed for two plants of a large tool and die manufacturer. An emergency response and notification system was developed for both plants. A building was designed to house a zinc phosphating wastewater treatment plant, raw chemical materials, and hazardous wastes.

Hazardous Waste Management Services - Michigan State University

Techna's hazardous waste management division is currently managing the transportation and disposal of all hazardous wastes generated by Michigan State University. Waste materials include solvents, discarded reagents, maintenance wastes, and animal wastes. Environmental consulting services are also being provided. These include procedural guidance, waste segregation, lab pack construction, waste sampling and analysis, and disposal site approvals.

Hazardous Waste Management Services - General Motors Corporation

Small-quantity hazardous wastes generated at the Delco Products Division, Livonia Plant are being managed. Halogenated and non-halogenated solvents, painting and maintenance wastes, and miscellaneous industrial chemical wastes are being transported to a variety of disposal sites. Techna is also responsible for periodic characterizations of waste streams and for maintaining waste approvals at the selected disposal sites.

Hazardous Waste Management Services - Chrysler Corporation

Techna Corporation has provided laboratory waste management services to Chrysler's Research and Development Center. These services included the segregation, packaging, and transportation of large numbers of waste laboratory chemicals and chemical products. All types of hazardous wastes, including flammables, reactives, corrosives, explosives, and unknown materials, were handled. These materials were managed through a combination of lab packing and co-mingling techniques. Several disposal sites nationwide were selected to receive the various types of waste materials.

Hazardous Waste Management Services - Ford Motor Company

Small quantity waste management and transportation services have been provided to various Ford Motor Company production and assembly plants. All types of specialty, banned, reactive, solvent, and unknown waste materials have been packaged and transported for disposal. Waste characterization and disposal site selection services have also been provided.

Waste Management Services - Consumers Power Company

Techna Corporation's waste management division has managed the small-quantity and specialty wastes generated by the Consumers Power Company facilities in Michigan for the past three years. Drum quantities of hazardous and non-hazardous wastes from laboratory, maintenance and general operations have been transported for disposal. Regulatory compliance services have been provided to Consumers Power to develop proper collection, segregation, packaging, and disposal procedures for a wide variety of waste streams. Waste materials have also been sampled and analyzed to determine their characteristics prior to selection of a disposal method and site.

ENVIRONMENTAL REGULATORY COMPLIANCE

Contingency Planning - Tool and Die Company

Comprehensive environmental response contingency plans were developed for two plants operated by a large tool and die company. Operations covered by the plan included metal forming and machining areas, zinc phosphate treatment lines, and a large wastewater treatment plant. The written plans encompass the emergency preparedness requirements of the Clean Water Act (SPCC), federal and state hazardous waste regulations, SARA Title III, the Toxic Substances Control Act (PCBs), Michigan Act 245 (PIPP), and local wastewater districts.

Emergency response procedures were developed in cooperation with the plant Emergency Coordinator. Appropriate emergency response and personal protection equipment was specified and installed.

Contingency Planning - Air Cargo Company

A chemical management contingency plan was developed for a large air cargo company. The plan included detailed responses to environmental and other chemical discharge emergencies involving the company's operations, maintenance, and fuel storage facilities. Preparation of the plan involved the development of new emergency response and inspection/monitoring procedures for the facility. The written plan was developed for compliance with all applicable federal, state, and local requirements for documented contingency planning.

Air Permitting Support Services

Techna Corporation managed all air effluent permitting activities for a large steel products manufacturing facility. Engineering drawings and specifications for several particulate emission sources were evaluated, and emission rates were calculated. All air permit applications were prepared, and negotiations were conducted with the permitting agency to establish permit conditions. Permits were granted without requirements for routine source compliance sampling and analysis.

DOT Compliance and Corporate Safety Programs

A complete program for ensuring compliance with Department of Transportation regulations was developed for a hazardous and non-hazardous wastes transportation company. The program included the development of operations, safety, and recordkeeping procedures and the preparation of a comprehensive written compliance manual. A training program was developed and presented to the company's managers and drivers.

An extensive safety and emergency response program and written manual were also developed for the company. All employees were trained to understand and implement the philosophies and procedures described in the program.

Wastewater Management Program

Techna Corporation is conducting a wastewater disposal feasibility study for a large, specialty steel products manufacturing company. Renewal of the groundwater discharge permit for the company's acid pickling rinse waters was threatened on the basis of seemingly non-representative chemical analysis data which indicated violations of permit requirements. Techna conducted an extensive regulatory evaluation program and performed a wastewater sampling and analysis program to determine the time-composited average concentrations of regulated contaminants in the wastewater.

The baseline sampling and analysis program was designed to determine the suitability of the wastewater for both groundwater and sewer system discharges without pretreatment. Sufficient data was collected for evaluation of pretreatment options. A cost-effectiveness study is being conducted to determine the best long-term discharge option.

Wastewater Pretreatment Standards Compliance Support

An NPDES wastewater pretreatment standards compliance program was developed and implemented for the electroplating wastewater treatment system of a specialty metal products fabrication company. A six-day sampling and analysis program was conducted to collect the data necessary for preparation of a baseline monitoring report. When the results revealed that the wastewater contained metals in excess of permitted levels, Techna assisted the company in optimizing the operation and effectiveness of its wastewater treatment plant. A baseline monitoring report was prepared and submitted to the county wastewater management district.

Development of Chemical Wastes and Process Effluent Management Programs

Wastes and effluent management programs were developed for a large plastics molding and coating company in Georgia. Sludges and wastewater from paint spray booths were sampled and analyzed for organic and inorganic species and hazardous waste characteristics. Proper waste accumulation, storage, transportation and disposal programs and effluent treatment systems were developed.

Sampling and Analysis of Wastewater and Groundwater

The electroplating wastewater treatment plant effluent from a General Motors plant was sampled continuously over a six-day period using an automated compositing sampler. The effluent was analyzed for all Priority Pollutant species, phenol, and cyanide, and the data was evaluated for regulatory compliance reporting.

Groundwater samples were collected from 18 wells placed upgradient and downgradient from a French Drain aquifer control system at the plant. The samples were analyzed for metals content, and the data was evaluated against historical records.

Effluent Monitoring Program

All wastewater sampling, analysis, and reporting tasks for preparation of an Effluent Guidelines Pretreatment Standards Baseline Monitoring Report were performed for a metal stripping and finishing plant. Both time-proportional (autosampler) and grab sampling techniques were required because of the batch nature of discharges and the lack of consolidated wastewater flows. A wastewater collection and sampling manifold system was designed to facilitate the future sampling of the regulated streams.

Analysis of Wastewater and Groundwater

Techna is managing the wastewater and groundwater analysis program of a major printed circuit board manufacturer. Independent laboratory selection, analysis method selection, quality control, and data review, evaluation, and reporting services are being provided.

Harless, J.M., "Impacts of Recent RCRA Changes on Hazardous Waste Generators," Michigan Industrial Hazardous Waste Conference, Detroit, MI, May 13-15, 1985.

Harless, J.M., "Local Government Agency Interactions with Hazardous Waste Generators," Hazardous Waste Issues for Local Government Officials Conference, Ann Arbor, MI, June 27, 1985.

Harless, J.M., "Chemical and Physical Analysis Requirements Under RCRA," Hazardous Waste Management - Realities and Remedies Symposium, American Chemical Society Annual Meeting, Chicago, IL, September 8-13, 1985.

Harless, J.M., "RCRA and CERCLA: Requirements, Realities and Society," Department of Engineering, Central Michigan University, October 21, 1985.

Harless, J.M., "Management of Hazardous Wastes in Industrial Research Laboratories," Ford Motor Company, Scientific Research Laboratories, Dearborn, MI, January 15, 1987.

Harless, J.M., "Environmental Audits for Hazardous Waste Management," Forging Industry Association Hazardous Waste Seminar, Chicago, IL, February 25, 1987.

Harless, J.M., "Sewage Disposal of Chemical Wastes - The Consultant's Liabilities," ACS Task Force on RCRA Symposium, American Chemical Society Annual Meeting, New Orleans, LA, August 30 - September 4, 1987.

Harless, J.M., "Hazard Determination for Hazard Communication," Symposium on Hazard Communication, American Chemical Society Midwest Regional Meeting, Wichita, KS, November 6, 1987.

Harless, J.M., and E.A. Cieply, "Labpacking vs. Co-Mingling of Hazardous Wastes," Third Chemical Congress of North America, Toronto, Canada, June 5 - 10, 1988.

Harless, J.M., and E.A. Cieply, "Management of Academic Laboratory Wastes - Tips from a Transporter," Third Chemical Congress of North America, Toronto, Canada, June 5 - 10, 1988.

MISCELLANEOUS PRESENTATIONS

Harless, J.M., "Computerized Management of Chemical Hazard Information," Laboratory Safety Short Course, American Chemical Society, Houston, TX, April 23, 1981.

Harless, J.M., D.B. Walters, C.W. Jameson and W.B. Beranek, "Chemical Health Concerns," Health Fields, NBC Television, New York, NY, November, 1981.

Harless, J.M., "Inside Environmental Consulting," Inside the Environment, WCBN, Ann Arbor, MI, September 14, 1984.

Harless, J.M., "Industrial Hygienists as Consultants," School of Public Health, The University of Michigan, October 6,1985.

Harless, J.M., "Environmental Risk Assessment for Real Estate Transactions," Commercial Lending Officer Seminar, Michigan National Bank Corporation, Troy, Michigan April 8, 1988.

PATENTS

Harless, J.M., et al., "Permeation Testing Apparatus," U.S. Patent No. 4,468,951, September 4, 1984.

CHARLES F. KOONS, P.E.

EDUCATION

M.S., Civil Engineering, State University of New York, In Progress
B.S., Civil Engineering, State University of New York, 1975

EXPERIENCE

* Summary

Section Leader, Techna Corporation	1988 - Date
Project Manager, Granger Construction Company	1985 - 1988
Project Resident Engineer, McNamee Porter and Seeley	1982 - 1985
Resident Engineer, McNamee Porter and Seeley	1977 - 1982

* Techna Corporation, Ann Arbor, Michigan

Primary responsibilities as Senior Project Engineer and Site Assessment Section Leader include design and management of hazard waste permit support programs and site investigation and remediation projects. Specific project activities include preparation of facility contingency plans, preparation of RCRA Part B permit applications, and development and implementation of RCRA Part A facility closure plans. Other technical responsibilities include environmental assessments, environmental compliance and risk assessment audits, and hazardous waste management programs. Activities have included development of Part B permit applications for automotive and chemical production plants, development of Part A closure plans for multiple container storage and UST sites, and management of numerous site investigation and risk assessment programs.

* Granger Construction Company, Lansing, Michigan

Served as Project Manager for construction of the Kent County (Michigan) Solid Waste Recovery Facility (refuse incineration/co-generation) and the G. Robert Cotton Correctional Facility. Responsibilities included negotiating and administering subcontracts, preparing cost estimates, coordinating design professionals, expediting/coordinating engineering design drawings, equipment and materials, and directing field supervisors.

* McNamee Porter and Seeley, Ann Arbor, Michigan

Activities as Project Resident Engineer involved on-site contract administration during construction of the wastewater treatment plant for the city of Lapeer, Michigan. Specific

responsibilities included on-site representation of design engineers, supervision of inspection and testing personnel, maintenance of construction records, and management and review of contractor performance. Also supervised the installation, testing and start-up of all architectural, structural, mechanical, electrical and instrumental systems and sub-systems.

Responsibilities as Resident Engineer included design and construction management for major plant expansions of the Three Rivers Filtration Plant in Fort wayne, Indiana. Additions included pneumatic material conveying systems, chemical feed equipment and dual media high rate gravity filters. Other responsibilities and activities as Resident Engineer included design and management of sanitary sewer installations and construction of sewer system pump stations in Green Oak Township, Michigan.

CERTIFICATIONS

Registered Professional Engineer - Michigan #28225

Grade AT Water Works Operator Certificate - Indiana #803159

AFFILIATIONS

National Society of Professional Engineers

SARAH BURTON

EDUCATION

M.S., Chemistry, University of Michigan, 1986
B.A., Chemistry, Russian Studies, Randolph-Macon Woman's College, 1985

EXPERIENCE

* Summary

Chemist, Techna Corproation	1988 - Date
Chemistry/Math Teacher, Greenhills School	1986 - 1988
Instructor, University of Michigan	1985 - 1986
Research Assistant, Virginia Chemicals, Inc.	1984

* Techna Corporation, Ann Arbor, Michigan

Responsibilities as chemist in the Chemical Management Section of Techna include hazards evaluations and risk assessments, SARA, DOT, RCRA, and OSHA categorization on over three thousand hazardous chemicals for purposes of incorporation into ChemReg, Techna's chemical regulatory compliance database. Activities have included several asbestos/ formaldehyde survey and risk assessments, in-plant chemical inventory development and management, environmental impairment resk assessments, and radioactivity surveys.

* Greenhills School, Ann Arbor, Michigan

Responsibilities as a chemistry and mathematics educator included standard teaching and preparation functions in chemistry, advanced chemistry, and algebra, as well as maintenance of laboratory equipment and chemical stockrooms. Activities included writing curriculums for new labs involving micro-technique.

* University of Michigan, Ann Arbor, Michigan

Responsibilities as a Chemistry Teaching Assistant included supervising general chemistry laboratories; leading recitation, discussion and problem-solving sessions; administering and grading written examinations.

* Virginia Chemicals, Portsmouth, Virginia

Responsibilities as a Research Assistant included developing new methods for quality control in the Analytical Research and Development Lab involving the use of capillary gas chromatography and atomic absorption spectrometry.

MARK K. LEMAY

EDUCATION

B.S.C.E., Lawrence Institute of Technology, 1982
Continuing Education
- Borehole Geophysical Methods - NWWA
- Groundwater Modeling - NWWA
- Aquifer Restoration - NWWA
- Groundwater Monitoring - NWWA
- Geophysical Methods - NWWA
- Safety At Hazardous Materials Sites - NWWA
- Groundwater Monitoring - USEPA

EXPERIENCE

* Summary

Project Engineer, Techna Corporation	1988 - Date
Project Engineer, McDowell & Associates	1984 - 1988
Quality Control Manager, Ajax Materials Corp.	1982 - 1984
Project Engineer, McDowell & Associates	1978 - 1982

* Techna Corporation, Ann Arbor, Michigan

Responsibilities as Project Engineer include design and implementation of site assessment programs consisting of site inspection, groundwater monitoring well design and installation, and collection of surface and sub-surface soil and groundwater samples for chemical analysis. Other activities include preparation of hydrogeological profiles, contaminant plume migration assessments, contaminated groundwater remediation design, environmental risk assessments for real estate transactions, and hazardous waste compliance programs.

* McDowell & Associates, Ferndale, Michigan

Responsibilities as Project Engineer included directing and planning geotechnical hydrogeological and hazardous waste site investigations. Specific activities included installation and monitoring of single and multi-level groundwater sampling devices, field testing of soil permeability, and the interpretation of field pump data. Other experience involved conducting on-site geophysical investigations and designing and developing a computer database to store, sort and retrieve over 80,000 pieces of data collected from over 4,000 soil boring logs.

* Ajax Materials Corporation, Madison Heights, Michigan

Duties included design, construction and management of laboratory facilities, as well as development and implementation of quality control/quality assurance procedures and programs as required by MDOT, FHWA, and FAA during the production of bituminous products.

MARY C. ADAMS

EDUCATION

B.S., Engineering Science, University of Michigan School of Engineering, 1983
B.S., Zoology, University of Michigan, 1973

EXPERIENCE

* Summary

Environmental Engineer, Techna Corporation	1986 - Date
Environmental Engineer, Roy F. Weston, Inc.	1985 - 1986
Associate Environmental Engineer, Environmental Research Group, Inc.	1984 - 1985
Engineering Technician, Ford Motor Company	1978 - 1981

* Techna Corporation, Ann Arbor, Michigan

Responsibilities as Environmental Engineer include design and implementation of site assessment programs at contaminated industrial and waste management facilities, environmental sampling, regulatory compliance programs, liaison with regulatory agencies, and environmental audits. Activities have included management of site assessment programs, design of remedial programs, and negotiations with regulatory agencies concerning site assessment and remedial action program requirements.

* Roy F. Weston, SPER Division, Romulus, Michigan

Performed environmental engineering, management, and safety services as a member of the Technical Assistance Team (TAT) for the USEPA Region V. Responsibilities included site assessment and site management activities at Superfund NPL sites and emergency response sites. Principal activities included design and implementation of site assessment programs, management of site activities including sampling and analysis, remedial actions, safety and health procedures, and subcontractor activities. Other activities included soil and water sampling, hazardous waste consolidation and sampling, data interpretation, and reporting. Sites included PCB contamination areas, abandoned hazardous waste sites, chemical spills, and industrial drum piles.

* Environmental Research Group, Inc., Ann Arbor, Michigan

Performed a wide variety of environmental regulatory compliance services for industrial clients. Specific responsibilities included project development, implementation, and reporting was well as regulatory interpretations and liaison with regulatory agencies. Activities included preparation of RCRA permit applications, development of hazardous waste management and minimization programs, preparation of wastewater discharge

permits, and management of NPDES effluent and RCRA groundwater monitoring programs. Other activities included sampling of soils, wastewater, groundwater, process streams, and point source air emissions as well as quality assurance monitoring of asbestos abatement activities.

* Ford Motor Company, Fuel Systems Engineering Laboratory, Dearborn, Michigan

Performed air and fuel flow tests on prototype and experimental carburetors to evaluate fuel efficiency variables. Other activities included evaluation of test data and preparation of test reports for submission to the USEPA.